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VDT imbroglio shifts to state legislatures

By Maura McEnaney
CW Staff

The battle surrounding VDT regulation is taking a new twist this year, moving out of study committees and into legislative chambers across the country.

State laws regulating VDT purchase and installation failed to make it onto the books during the last legislative sessions. However, this year, intense organization and burgeoning media interest have set the issue afire once again.

Almost half the nation's states are considering VDT bills this legislative term. Many of the states with no pending VDT bills are contemplating such proposals as guidelines for purchasing VDT equipment.

The proposed laws fall into the following four general categories:

- Ergonomic bills that require employers to provide VDT workers with devices like nonglare and adjustable screens and removable keyboards. Ergonomic bills also mandate work breaks and, in some cases, require employers to provide alternative work for pregnant employees operating VDTs. The latter issue remains the most controversial for VDT legislation opponents, who maintain that scientific studies show no evidence that VDT exposure causes birth defects or miscarriages.
- Right-to-know bills aimed at educating and training workers about VDT use and maintenance.
- Purchasing guidelines for public agencies, as well as the establishment of study committees and education programs.
- Comprehensive legislation, which includes aspects of the above three categories.

"We're tracking 28 states," said Marty Dick-

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Is industry downturn pegged to DP spending?

By Clinton Wilder
CW Staff

Although several leading computer vendors have reported declining sales growth in the first quarter of 1985, interviews with corporate DP and MIS executives reveal widely varied opinions on vendors' reports of a slowdown in corporate DP spending.

Several corporate DP users interviewed recently said their plans to order mainframes, peripherals and microcomputers are as healthy as ever. But others, including the nation's fourth largest commercial bank, have confirmed they are holding off on purchases, especially purchases of mainframes.

IBM, Digital Equipment Corp., Wang Laboratories, Inc. and Data General Corp. have all reported declining growth rates and all but DG have discontinued products or declared temporary production halts in the first quarter of 1985. Semiconductor makers laid off hundreds of workers as chip orders from computer makers nose-dived. Although several manufacturers blamed the downturn on declining export sales brought on by the strong dollar, they also cited a soft domestic business market as a factor in lower revenue.

"There's no slowdown in our case," said Bob Nelson, director of corporate information systems at Puget Sound Power & Light Co. in Bellevue, Wash. "We're right on the growth curve we planned three years ago and will probably upgrade from an IBM 3083

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TOP OF THE NEWS

Scientist, entrepreneur and businessman Gene Amdahl reflects on his successes and failures and on the state of the computer industry in an exclusive interview. **Page 15.**

CW photo by S. Hall

■

The beta user of Software AG's Super Natural gave high marks to the package's rapid inquiry and reporting access to live production data. **Page 4.**

■

At last count, 235 micros from more than 30 vendors were in use at Woods Hole Oceanographic Institution, which has no top-down microcomputer plan. **Page 8.**

■

Burroughs launched an OA thrust spearheaded by a word processing system and an OA software package for its mainframes. **Page 12.**

■

Altos Computer Systems will use a new 32-bit microprocessor to power a 30-user supermicrocomputer featuring 1M byte of RAM and a 20M-byte hard disk. **Page 75.**

IBM to halt PCjr production

By Paul Korzeniowski and Ed Warner
CW Staff

ARMONK, N.Y. — The IBM PCjr's novalike existence ended last week as Big Blue announced that it would cease manufacturing the machine next month.

Introduced in November 1983, the PCjr marked IBM's entry into the home and education markets, which were dominated by Apple Computer, Inc., Tandy Corp. and Commodore Business Machines, Inc. Despite its dominant position as the world's largest computer manufacturer, IBM experienced difficulty in gaining a foothold in these markets. As analysts noted, IBM's strength in the large systems market did not translate into sales at the low end.

Six months after the PCjr was introduced, it was selling at a rate of only 2,400 units a month. IBM tried to increase sales by upgrading the computer's memory and replacing a controversial Chiclet-style keyboard with a typewriter-quality offering.

But the moves did little to help sales, analysts noted. Rather than competing with Apple and Tandy machines, IBM found that the PCjr was competing with its Personal Computer, according to Maureen Fleming, senior analyst at International Resource Development, Inc., a Norwalk, Conn.-based market research firm.

Last Christmas season, IBM bundled the PCjr with a color monitor and offered dealers $200 rebates on sales of the machine. In December, 96,000 machines were sold, about one-third the total PCjr sales for the entire

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LIFE AND TIMES OF PCjr

December 1983	No PCjrs available for Christmas season.
July 1984	IBM sells 2,400 PCjrs in one month; replaces Chiclet keyboard and upgrades memory.
December 1984	IBM sells 96,000 PCjrs in one month.

CW CHART

Shared micros commonplace

DALLAS — The personal computer may not be as personal as its name implies, according to a recent study by Future Computing, Inc. The study found that one quarter of personal computers in use by businesses are shared by 10 or more users.

The study, based on telephone interviews and 45,000 responses to a mailed questionnaire, also found that an average of 2.3 people share an office personal computer, according to Joe Curry, a senior analyst at Future Computing.

"The term 'personal computer' is a misnomer, given that [the micro] is in shared use," Curry observed. He explained the popularity of shared use by saying that "industries can't always justify users having their own personal computers; in any company [there is] a limited budget that can be allocated for personal computers."

The study also examined the practice of personal computing in 17 industries and

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NEWSPAPER

Labor board sizing up EDS workers' bid for unionization

Bargaining units focus of hearings

By John Desmond
CW Staff

DETROIT — Hearings before the National Labor Relations Board (NLRB) on attempts to unionize DP professionals transferred from General Motors Corp. to Electronic Data Systems Corp. (EDS) are focusing on the number and composition of bargaining units and on whether GM and EDS both or EDS alone employs the DP workers.

The hearings began Feb. 25, following the signing of United Auto Workers (UAW) petitions by 700 to 800 DP workers in Michigan. According to UAW organizer Maurice Long, who is coordinating the union effort, the union has proposed 14 bargaining units, whereas EDS has argued for only two nationwide. If conducted, separate union elections would be held for each bargaining unit.

Under the EDS plan, one bargaining unit would include professionals such as programmers and systems analysts; the other would include technicians, such as data-entry personnel and operators. The UAW has proposed that DP bargaining units include a mix of DP personnel in 14 geographic areas. The UAW is also arguing that GM and EDS are joint employers of the DP professionals, while EDS asserts it is sole employer.

Long charged that EDS is trying to "drag [the hearings] out to discourage interest" in the union and also to relocate union supporters away from the 14 sites that submitted petitions to the NLRB. Employees petitioning for a union are also being offered a two-day, all-expense-paid trip to Dallas, where, Long claimed, they are "wined and dined" in an effort by EDS management to win support.

In response, attorney John Howell of EDS said suggestions that hearings are being dragged out and union supporters are being singled out for relocation are "categorically false." He added, "The union recognized that it had a window of unrest to capitalize on. As time goes on, their support wanes."

'Far from wining and dining'

Further, he said, workers are being relocated as a "natural result of EDS taking over this mammoth DP organization." The trips to Dallas are "far from wining and dining" and are not directed at union supporters but at a number of transferred GM employees, he said.

In a related matter, efforts by transferred GM DP professionals to raise a legal fund to challenge a perceived loss of benefits have apparently been neutralized.

In order for transferred employees to receive stock grants of 100 to 1,000 shares promised by EDS and GM, the employees had to sign a release by March 14 stating they agreed not to sue the company over issues arising from their transfer, Howell acknowledged.

The legality of the release is being challenged by two transferred GM employees who filed a class action suit against the company alleging a loss of retirement benefits. The suit — filed by attorney Jules Olsman, representing Thomas Omans and Gary Cattin of the GM Technical Center in Warren, Mich. — maintains that the loss of certain retirement benefits is a violation of federal pension law. Olsman claimed the EDS release is void because it offered workers no compensation for giving up their right to sue.

Olsman maintained that transferred workers were offered stock before being told of the release. Howell of EDS answered that he is not sure when transferred employees were given details of the release.

Judge John Feikins of the U.S. District Court here issued a 10-day restraining order preventing EDS from asserting that employees have agreed to the release by accepting stock. The order expired March 14, and Feikins has yet to decide whether the release is valid, Olsman said. Feikins also has yet to rule who is included in the class of transferred GM workers affected by the Omans-Cattin suit.

State examines charges of $50 million DP cost overrun

By John Desmond
CW Staff

LANSING, Mich. — A state Senate committee here is investigating charges that a computer system bought by a state agency from IBM is costing too much and has performance problems. Meanwhile, a consultant has claimed the problems are due mainly to the agency's inability to attract qualified staff.

In 1980, the Michigan Employment Security Division (MESC) contracted to buy an IBM system consisting of a central 4381 processor and eight 4341 processors distributed in regional offices. Although contract figures are being disputed, the legislators charged that original estimates of $30 million have ballooned to more than $80 million.

At a recent hearing, members of Michigan's Senate Labor Committee expressed dissatisfaction with answers provided by the MESC staff and representatives of Arthur Andersen & Co. of Detroit, consultants on the project. To follow up the hearing, state Sen. Doug Cruce said a full-scale audit of the MESC contract will be conducted.

'There is nothing shady here'

Gerald Brundle, an Arthur Andersen partner, said he welcomed the audit, commenting, "There is nothing shady here." Describing how the MESC system problems arose, Brundle said the agency's DP shop made a transition from an IBM 370/155 to a state-of-the-art system in 1981.

"Their [the MESC] technology was obsolete," he said. "And they did not have the people in DP with the skills to take on such a project." According to Brundle, the MESC had difficulty competing in the private sector for skilled operators and programmers. "We came on to make up [for] the shortfall," he added.

Arthur Andersen consultants supported the system from January 1981 until mid-1984, when they were instructed by the MESC to phase out that support. But the MESC had made virtually no progress in hiring its own skilled staff, so the system "could not run without our expertise," Brundle said.

Brundle described the resulting problems: A backlog of batch jobs began piling up during December, January and February. Unemployment checks that should have taken five minutes to produce were taking 20 minutes. The delays caused long lines and dissatisfied customers. In addition, the MESC could not send out updated information to employers on what they were being charged for benefit contributions. As a result, belief that the system was not working grew, Brundle said.

Referring to Brundle's testimony at the hearing, Cruce said the consultant "continually cited statistics [on system uptime] that seemed to grossly contradict reality." Cruce estimated that the audit will take until mid-August to complete.

Burroughs ready to answer Sierra

NEW YORK — Burroughs Corp. tomorrow is expected to announce a high-end addition to its A series mainframes, said to be comparable in size to IBM's recently announced Sierra series, a Burroughs official disclosed last week.

The official, a senior marketing manager, claimed the processor will "be larger than Sierra ... and available much sooner" than IBM's machines.

Burroughs is also stated to unveil a series of mid-range processors at the press conference here. Featured at the conference will be W. Michael Blumenthal, chairman and chief executive officer, and Paul G. Stern, president and chief operating officer.

Blumenthal is expected to discuss the company's strategic mainframe direction in light of the high-end announcement. Also expected at the press conference is the announcement of several enhancements to existing Burroughs hardware.

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NEWS

Hospital finds Super Natural aids access to live data

FIRST USER

By John Gallant
CW Staff

WALTHAM, Mass. — The supernatural rarely plays a part in helping an information systems department implement its strategic plan.

But that is the situation at Waltham Hospital here, even though the supernatural refers to a software package. The 305-bed hospital is a beta test site for Software AG of North America, Inc.'s Super Natural, an end-user inquiry and reporting package that augments Software AG's Adabas data base management system and its Natural high-level applications development language.

Although currently operating in a test environment, Super Natural is helping MIS director Donald Cotton achieve at least one of his organization's strategic goals — getting live production data out to end users.

"Our goal has been to get data out to the people who pay the bills — the end users," Cotton said. "It has been next to impossible to meet the demand for data without adding extra programmers, but Super Natural will let me do that. Super Natural will get [MIS] out of the circle of developing applications the way we think they should be built and let the end users get at data the way they want."

Waltham Hospital's three-year strategic MIS plan was implemented in April 1983. Cotton said the MIS department was then migrating from an IBM System/3 small business computer, which supported the hospital's IBM RPG-II applications development, to an IBM 4331.

Cotton said the MIS department considered installing IBM's Patient Care software — a move that would have required the purchase of IBM's DL/1 DBMS and a shift to Cobol programming — but chose Software AG's Adabas and Natural instead. Since that time, the hospital's major applications systems — admitting, outpatient information, payroll and purchasing — have been restructured as fully on-line systems under Natural, which now supports all programming efforts.

Although Natural proved to be a superb programming productivity tool, the hospital reported, one aspect of it that prompted the implementation of Super Natural was a disappointment.

Natural not for unsophisticated users

"The focus of the overall game plan was to marry data with end users," said Joseph Ferro Jr., senior vice-president of finance. "One key to that was to acquire the DBMS, and the other was to provide data access through a friendly user language. But Natural just did not make it for unsophisticated end users. Fortunately, the company came out with Super Natural."

According to Cotton, Super Natural runs as an application under Natural and IBM's DOS/VSE on Waltham Hospital's IBM 4361, which recently replaced the 4331. Through menus and prompts, Super Natural allows end users to create reports and inquiries that access live production data maintained in Adabas. It automatically generates the Natural code required to perform the data base access. Super Natural itself can be accessed through a terminal or from a microcomputer via Software AG's Natural Connection.

Cotton said he plans a phased implementation that will eventually provide on-line access to Super Natural from 60 terminals throughout the hospital. "I am training one of my staff members to become our resident Super Natural expert," he said. "In addition, we will train selected people within each department who can teach others. If we just presented this product to the whole hospital at once, I would be swamped with requests for help."

Both Cotton and Ferro have already made use of Super Natural. In 10 minutes, Cotton designed a report showing the impact on each of the hospital's departments of a pay increase for Licensed Practical Nurses. Cotton said it took nearly a day for a programmer to develop a similar program written in RPG-II two years ago.

'We cannot wait for days or weeks for information'

"We are preparing for a bond issue," Ferro said, "and we needed to review our capital equipment expenditures. We were able to access that information in about five minutes with Super Natural. Our managers need that kind of access to data to help them make their decisions more quickly. We cannot wait for days or weeks for MIS to give us relatively simple information."

Cotton said Super Natural will free programmers from the task of developing ad hoc reports, allowing them to focus on building and maintaining core applications. In addition, it may help stem the influx of micros into Waltham Hospital — an issue that has been a cause for concern for Cotton.

"We have found that we cannot stop the intrusion of micros, but Super Natural is a tool that just might reduce the need for them," he noted. "We will be able to support most requirements through terminals because Super Natural makes so much mainframe information available to users. It provides a better view of the data base than most micro tools." More importantly, he said, Super Natural will help the hospital stay on track with its MIS strategy. "Our goal is to have data access capabilities in the hands of end users by the end of the third year. We can do that with Super Natural."

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year and three times the number of Personal Computers sold that month.

Despite the sales increase, IBM was not making much money selling the machines. Future Computing, Inc., a Richardson, Texas, market research firm, estimated that IBM spent $450 for parts for each PCjr, which listed for $995. Comparably, parts for a Personal Computer cost $685, and it had a retail price of $2,500, the firm estimated.

"No one, not even IBM, could afford to give the machine away," IRD's Fleming noted.

The rebate program ended in February, as did the PCjr's luster. "IBM's share of the home market [sales] dropped from 17% in December to 4% in February," according to Abbi Lawrence, research analyst at Infocorp, a market research firm based in Cupertino, Calif. "So the product was dropped."

'Was never a big seller'

The announcement to drop the PCjr generally did not surprise industry observers. "The PCjr was never a big seller," noted Doug Carlston, president of Broderbund Software, Inc., a home market software vendor located in San Rafael, Calif. "The only time it sold well was last Christmas, when IBM was giving the machine away."

Seymour Merrin, chairman of Computerworks in Westport, Conn., hailed the move. "IBM is finally showing signs of maturity and is helping to eliminate confusion in distribution channels. . . . By dropping this machine, IBM also has eliminated confusion about its product line," he explained.

Industry observers agreed that Apple would be the chief beneficiary of the PCjr's demise. "Steven Jobs and John Sculley are lifting champagne glasses right now," Merrin said.

Lawrence added, "Apple is now the only major manufacturer selling a $1,000 home computer."

Analysts differed on IBM's plans, with some speculation that IBM would eventually reenter the home market. "IBM will examine the home market and cautiously enter it in 1986," Lawrence predicted.

Aaron Goldberg, director of microcomputer system services at International Data Corp. in Santa Clara, Calif., concurred, saying, "The educational market is too important for IBM to give up."

Observers also differed when asked if this decision reflected IBM's recent reorganization, which moved Philip D. Estridge from president of IBM's Entry Systems Division (ESD) (where the Personal Computer line is manufactured) to vice-president of manufacturing [CW, Mar. 18]. "Manufacturing is the most important division at IBM," IRD's Fleming noted. "Moving Philip Estridge to the manufacturing operation can be seen as a promotion. The reorganization allowed IBM to drop the PCjr without implicating an IBM official."

Merrin differed, noting, "Dropping the PCjr is the first of a series of changes that will be made at ESD — changes that I think will benefit everyone, including IBM."

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among 15 occupations. It reportedly found the banking industry to be the biggest user and the retail industry to be the smallest. Respondents from the industries most involved in personal computing were most likely to be using an IBM Personal Computer, the survey said. Firms least involved in personal computing also had the fewest Personal Computer users, the survey said.

From that finding, the study projected that personal computer manufacturers that compete with such major players as IBM, Apple Computer, Inc., Compaq Computer Corp. and AT&T should tailor their machines for use by those industries that currently are only slightly involved in personal computing.

Curry said the data from the survey's questionnaire was bolstered by follow-up telephone interviews with 3,000 respondents, 1,337 of whom were current micro users.

The profession that used personal computers the most, the survey found, was systems analysis. Half of all systems analysts use a micro, and 35% of those machines are from IBM, the survey noted. Salesmen and retail store owners were found to use micros the least, Curry added.

The survey found that IBM's presence was strongest among banking office workers, with 18% using Personal Computers and 7% using Personal Computer XTs. Apple microcomputers, meanwhile, were in use by only 5% of respondents from bank offices.

The survey, "Office Personal Computers: The Customers," is available for $3,000 from Future Computing, 8111 L.B.J. Freeway, Dallas, Texas 75251.

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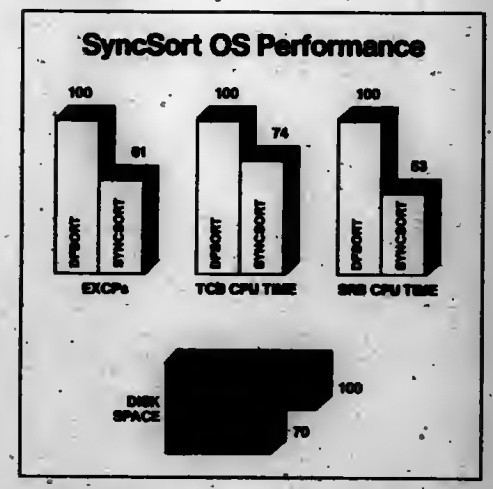

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VDT from page 1

insen, VDT campaign project coordinator of the Service Employees Industrial Union (SEIU).

Last October, the SEIU joined forces with 9 to 5, the National Association of Working Women, with the hope of introducing legislation in 18 states. Many of the VDT bills filed resemble a comprehensive model bill designed by 9 to 5.

Those bills are meeting plenty of organized opposition. This year, large organizations using VDTs, such as the Air Transportation Association and the American Insurance Association (AIA), teamed up with the Computer and Business Equipment Manufacturers Association (Cbema) to form the Coalition for Office Technology.

According to James Brodsky, AIA corporate secretary and counsel, the coalition represents a more concentrated effort by the AIA and about a dozen member organizations to fight VDT legislation. Other coalition members include the American Newspaper Publishers Association, IBM and Digital Equipment Corp.

In years past, the AIA monitored Cbema's efforts against VDT legislation but remained out of the spotlight, Brodsky said.

"We did some lobbying, but [it wasn't] a full-blown effort," he said.

Although much of the proposed legislation around the country seeks to regulate ergonomic issues and mandates things like rest breaks and eye examinations for VDT workers, opponents say business should and can take on the role of educator.

> *Employees' problems with VDTs are too personal for far-reaching legislation.*

Employees' problems with VDTs are too personal for far-reaching legislation, the groups maintain.

To further emphasize that point, the Coalition for Office Technology is in the process of establishing an information center in Washington, D.C., which represents a more concentrated effort by business, Brodsky said.

Because it is no longer a new issue, "we're becoming experienced" in the VDT battle, said Zemphria Baskin, manager of government affairs at the Air Transport Association of America (ATA).

The ATA represents 31 U.S. airlines employing 150,000 VDT workers. The group tracks up to 4,000 bills filed nationwide each year, Baskin said. Nevertheless, she said, "At this point, the proponents are far more organized. It's their only issue."

States vary in approach to VDT legislation

By Maura McEnaney
CW Staff

Bills regulating VDT use being reviewed by state legislatures across the country are as different as the states from which they originate.

Oregon is the state furthest along in its attempt to implement VDT regulations. Earlier this month, the Oregon state Senate nearly gave its unanimous (27-1) approval to an education and ergonomics bill, which is now awaiting action from the state's Labor Committee in the House of Representatives.

The bill was recommended to the biennial legislature last year by a bipartisan committee of senators and representatives from business, unions and government agencies. It requires the state's Accident Prevention Division to set up an education program for employers in both the public and private sectors and requires the division to come up with guidelines for making VDT workstations ergonomically correct.

If adopted, the guidelines would be optional for private sector businesses and mandatory for state agencies where workstations are used for four hours or more each day. Machines already in use would not be subject to the regulations.

This year's VDT bill is a stripped-down version of a 1983 bill with more stringent guidelines. That bill died in committee, according to Doug Crooks, assistant executive director for the Service Employees International Union (SEIU) in Oregon. The SEIU is working with 9 to 5, the National Association of Working Women, to push for VDT regulations.

Crooks said it could be two or three weeks before the bill gets to the floor of the Oregon House, where, he said, it has an even chance of passing. Even with House approval, sources believe Oregon's governor, Victor Atiyeh, will veto any VDT legislation that reaches his desk. A spokesman in the governor's office said Atiyeh believes VDT regulations should fall under the jurisdiction of state regulatory agencies, not statutory regulations.

Opponents are already confident they have succeeded in stopping the VDT bill this year. "We have enough votes to defeat it on the House floor," said Gary Conkling, government relations manager at Tektronix, Inc.

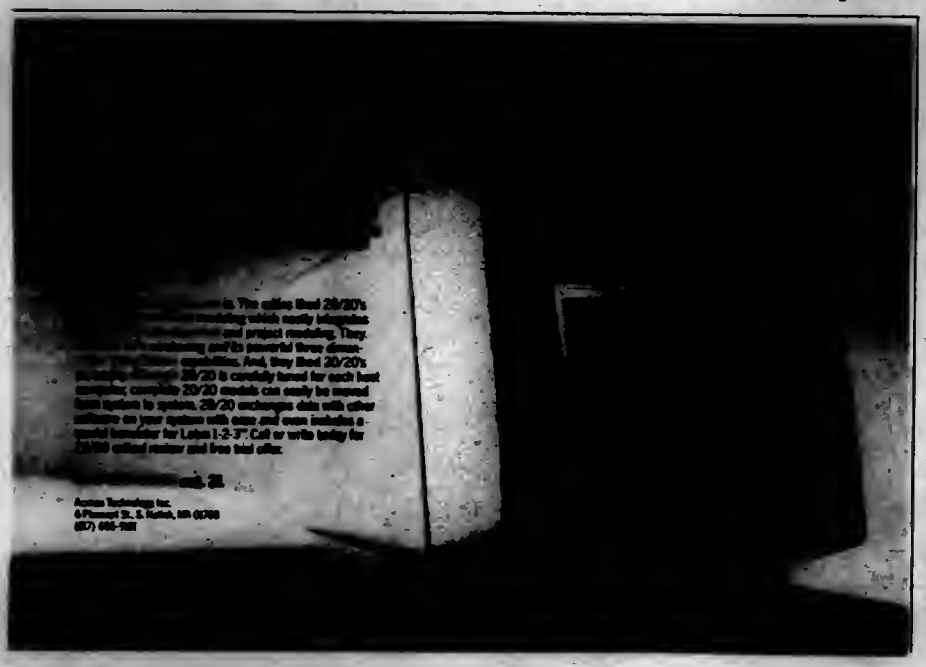
Issues relating to VDT use are better addressed outside the legislative chambers, Conkling said. "We ought to take a stab at bad management policies" rather than machines, he said. Conkling and others believe this year's bill is an attempt to get any kind of VDT legislation on the books. "Within certain circles an attempt is being made to be the first state to get the VDT scalp," he said.

Proponents of VDT legislation agreed somewhat. "Things are pushing so hard in each state," said Marty Dickinson, VDT project coordinator for the SEIU "We are going to get VDT legislation somewhere on the books some time this year."

In Massachusetts, hearings on seven VDT bills will start early next month. According to William J. McCarthy, general counsel for the Associated Industries of Massachusetts, which is spearheading the effort against VDT regulations, the Massachusetts legislature has rejected VDT safety bills during each of the past five years. Last year, Massachusetts issued purchasing specifications and voluntary workstation guidelines for state offices using VDTs. The Massachusetts Department of Labor and Industries received a $75,000 appropriation to study the effects of VDTs.

While she termed those guidelines "a good first step," Elaine Taber, 9 to 5's program director, said Massachusetts still needs legislative action. The voluntary guidelines are for state workers only and do not cover the potential risks associated with VDT use, Taber noted.

SOURCES: SERVICE EMPLOYEES INTERNATIONAL UNION, AIR TRANSPORT ASSOCIATION OF AMERICA, COMPUTER AND BUSINESS EQUIPMENT MANUFACTURERS ASSOCIATION



FDR/COMPAKTOR/ABR
Innovation Data Processing, Incorporated

MANAGEMENT SUMMARY

FDR (formally known as Fast Dump Restore) is a dump and restore utility designed to reduce the time required to produce a dump and restore the data. FDR replaces all standard IBM dump/restore utilities, supports all VS1 and MVS(XA) environments, and can be used with most IBM and compatible disk devices.

FDR uses three method plans in attaining input/output efficiency: 1) the use of increased blocking factors, 2) the elimination of redundant and unnecessary data, and 3) the use of cylinder orientation to minimize delays due to physical rotation, arm movement, and so on. FDR also offers a performance option (BUFNO=MAX) that increases the number of buffers FDR uses during the dump operation, and is designed to decrease elapsed time and save system resources. FDR has a full-volume disk-to-disk feature.

FDR includes a *Stand-Alone Restore* (SAR) program. This program allows restoration of a full-disk volume when, due to the unavailability of a VS1 or MVS operating system, FDR cannot be run. SAR can also be used to restore partial volumes and to clip a volume. SAR also aids the operator by issuing prompting messages on the console and error messages on the console, printer or tape whenever a problem is encountered during the restore. SAR also permits the Restore of specific tracks.

Recent enhancements to SAR include support of stand-alone operations in MVS/XA mode, a standalone backup capability, and support of backup and restore functions under VM.

A no-charge option available to FDR users is the *Data Set Functions* (DSF) subsystem. DSF allows the user to dump and restore individual data sets on a pack and to dump and restore by absolute tracks. It can also be used to restore data sets from full-volume FDR backup tapes and allows the user to rename a data set when restoring it. Password protection is provided, and can be activated on either a volume or data set basis.

Compaktor (CPK), an extra-cost option, is a disk management utility used to reorganize direct-access volumes using the FDR methodology. It reduces space fragmentation, merges data set extents, aids in positioning data sets, and offers several other solutions to frequent disk pack organization problems.

Automatic Backup and Recovery (ABR) is another extra-cost option that manages disk space on direct-access volumes. Disk volume and data set backup can be automated based on the last reference date and update characteristics. Data sets that have not been used for a time period can be automatically archived, freeing the disk space for more productive use. Reports can be tailored to user specifications. A Data Set Not Found Exit permits the Automatic Restore of data sets that have been archived without user intervention. The vendor recently released extensive ABR panels for TSO users. The panels provide complete dataset and volume reporting, thus permitting and users more direct control over their datasets. ABR is designed to operate with both the DSF and Compaktor subsystems.

FDR provides enhanced support for VSAM files which are cataloged into an ICF catalog. These data sets are also relocatable with DSF and ABR.

COMPETITIVE POSITION

While the package listed on page one of this report compete with the FDR/Compaktor/ABR products, the only competition for FDR itself is IBM's DF/DSS. FDR is more efficient than the IBM product. This, along with its reliability, account for FDR's very extensive user base.

The other products listed as competition are disk space management packages and thus compete with ABR. The main competition includes Cambridge's ASM2 and Sterling's DMS/OS. While both of these products were introduced several years before ABR, neither has as large a user base. In addition, they are both more expensive than ABR.

The FDR/Compaktor/ABR family of products holds a very strong market position that is likely to continue. The family provides outstanding performance and reliability, and the vendor has earned a reputation for quality control that is equalled by few in the industry.

ADVANTAGES AND RESTRICTIONS

FDR, as its name implies, is a fast method for dumping and restoring data. The package is faster and more efficient than similar IBM utilities, and achieves a high performance level, reducing elapsed time and saving system resources.

A major advantage is the Stand-Alone Restore program. The ability to backup and restore disk volumes without an available operating system is critical to disaster recovery. The automatic restore to unlike devices and the automatic restore of archived files are additional advantages.

Another major advantage is the outstanding reliability of both the product and the vendor, as attested to by the rating in Table 1 and the wealth of comments from users. Many consider FDR the most reliable software package they have ever used, with never a bug to be found. Another decided advantage of FDR is the free 90-day trial offering.

USER REACTION

Twenty-three users of FDR responded to an independent Datapro survey. The average age of installation was 4½ years. The utility was running on various IBM mainframes as well as on an Amdahl 5860 and three NAS models. All but one were running under MVS, MVS/SP, or MVS/XA.

Not every respondent rated all categories. Six did not rate User education, explaining that none is available.

TABLE 1.

	Exicel.	Good	Fair	Poor	MAUR*	CA**
Reliability	23	0	0	0	4.00	1
Efficiency	19	4	0	0	3.83	1
Ease of installation	20	3	0	0	3.87	1
Ease of use	12	10	1	0	3.48	1
Troubleshooting	19	3	0	0	3.86	1
Documentation	10	9	3	1	3.22	1
User education	5	4	6	2	2.71	2
Vendor's maintenance	14	7	0	0	3.67	1
Overall satisfaction	17	5	0	0	3.77	1

*Mean Average User Rating, on a scale of 4.0 for Excellent.
**Cluster Analysis—the range of average user ratings attributed to each cluster for each category, where Cluster 1 is the highest and Cluster 4 is the lowest. (See Report 70E-010-40 for individual category Cluster allocations.)

These users overwhelmingly stressed the advantages of FDR. All 23 said the package performed as promised by the vendor. Many comments were made regarding the outstanding reliability of the package, with long-time users saying that they have never had any problem with FDR. They consider IDP the most reliable software firm they have ever dealt with, with one commenting: "I wish some of the big name software folks took some lessons in quality assurance from Innovation." This is also reflected in the table above, with reliability receiving a very rare 4.00 rating.

Twenty users said FDR saves system resources, 18 said it saves staff time, 12 considered it inexpensive, and 16 said that using FDR resulted in financial savings for their companies. Fourteen considered the package simple to operate and 10 said it is flexible in its capabilities, allowing different device migration, archiving, single dataset restore, and global functionality.

Several users praised the vendor for providing excellent technical support. IDP is very responsive to problems or questions and the support staff is very well trained with thorough knowledge of the internals of FDR and MVS. In addition, IDP is quick to upgrade their product as soon as IBM announces any new hardware or system modifications. Furthermore, the vendor is continually improving and enhancing their products' capabilities.

Few restrictions were mentioned. Two users considered FDR complex and one said it is inflexible, while another said that the migration facility for data set movement to unlike devices is slow. One user said the documentation is poorly organized, while the user who rated documentation poor commented that there is no overall description of how all the components of the package fit together. As a result of this, much than is spent flipping through the manual to determine what is needed to carry out a requested function. A vendor spokesman explained that reorganization of the documentation is difficult because some users have only one component of the product. While there are no major plans for changing the documentation, the vendor is currently adding more examples of how to use the product. □

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Loose acquisition policy yields mixed bag of DP gear

By Eric Dexter
CW Staff

WOODS HOLE, Mass. — Mainstream data processing operations are living side-by-side with a free-for-all attitude among researchers who use computers at the Woods Hole Oceanographic Institution here.

"There are no top-down rules about acquiring personal computers," said William Little, manager of the Information Processing and Communications Laboratory, whose job most closely resembles that of a DP manager. In fact, he noted, there is nothing to prevent researchers from going out and buying their own 32-bit superminis, a situation that has also happened.

Once they find funding for their research projects, scientists are free to buy whatever computers or software they think the projects demand or to purchase their own disk drives for the Digital Equipment Corp. VAX-11 machines Little's group maintains, the laboratory manager noted in a recent interview.

Flexibility, but difficulties

The institution is run by scientists with strong computer backgrounds who want to give researchers the freedom to choose their own equipment. This setup gives a lot of flexibility and the opportunity to snap up some bargains, Little said. But the approach also boosts support costs and the difficulties involved in tying the various machines together, he observed.

Although a single purchasing agent ends up buying most of the micros, the overall situation is chaotic, according to Andy Maffei, who supervises both data communications and personal computer support. However, he added that it makes a lot of sense to provide some centralized services.

Most scientists and assistants at Woods Hole work with computers, Little said. In addition to seven VAXs and five Wang Laboratories, Inc. word processing systems, a recent survey found approximately 235 micros from more than 30 vendors in use in offices and labs and in the field.

Of the micros, 47 are NEC Information Systems, Inc. Advanced Personal Computer IIs; 23 are IBM Personal Computers; 21 are Apple Computer, Inc. Apple IIs; 11 are Compaq Computer Corp. Portables; 10 are Tandy Corp. Model 100s; and the rest are split randomly among other vendors.

While many micros handle standard tasks such as word processing and budgeting, others are used for more unusual jobs, according to programmer Ann Martin. Martin tracks micros throughout the institution for an on-line data base designed to let employees know who has what equipment.

For example, the head of the institution's Physical Oceanography Department runs numerical models; while the Deep Submergence Laboratory performs image processing; and other scientists do computer-aided design or other graphics work. Stockroom employees handle their inventory, and chemical labs set up automatic data acquisition systems. The list goes on, Martin said.

The submersible *Alvin*

Hewlett-Packard Co. HP 2100 series minicomputers were the institution's standard real-time ship computers until around 1980, when they began to be phased out by micros, Little said.

The larger systems are not necessarily missed. They were expensive, their sheer size made them difficult to move around and if the disk drives crashed, the research cruise probably ended. Many of the mini's tasks are now done on a smaller, less expensive micro.

In one case, a Personal Computer on a supporting research vessel processes navigation data for the three-person submersible *Alvin*. The *Alvin* works worldwide, and "it's a lot easier to fly an IBM [Personal Computer] around than one of those big machines," Maffei pointed out.

In addition to placing increasing numbers of micros on ships, the laboratory also build computers for specialized data acquisition, which requires a great deal of computer expertise, Little said. As one illustration, he pointed out that most printed-circuit boards are not round, but a circular shape is a requirement to fit into standard deep-sea instrumentation casings.

Kenneth Prada, manager of the institution's Applied Engineering Laboratory, said that without specialized micros in oceanographic instrumentation, "there [would] be no need for microcomputers on shore, because there [would] be no data for them to process."

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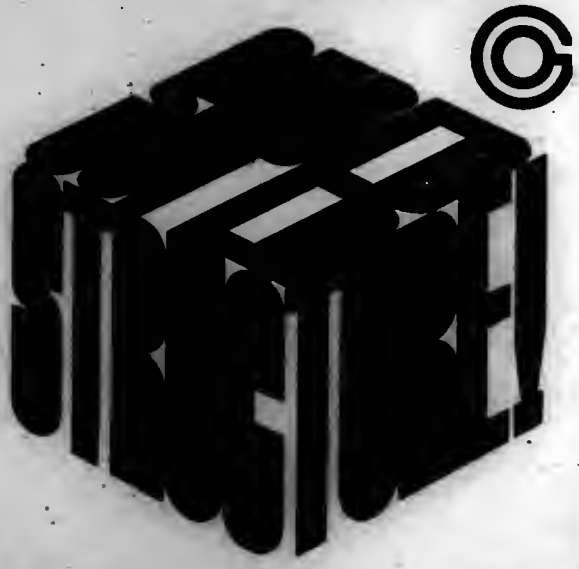

File transfer high on list of user's needs

Within the polyglot computer environment at Woods Hole Oceanographic Institution in Woods Hole, Mass., there is a great deal of interest in transferring files to other machines — particularly to its Digital Equipment Corp. VAX supermicro, said Bob Gomes, VAX systems supervisor.

Although one VAX handles administrative tasks in downtown Woods Hole, the remaining six VAXs are dedicated to scientific processing and are located two miles away in the Clark Building, a laboratory on the waterfront Quissett, Mass., campus. Two of these machines are owned by the institution and run by the Information Processing and Communications Laboratory, Gomes said. There is a mixture of commercial and proprietary software for the other four VAXs, which [illegible] client to operate [illegible]

VAX stays in the Clark [illegible] each section has commercial [illegible] the building's [illegible] there in the Woods Hole [illegible] each section shares [illegible] [illegible]

VAX acts hub to share data

The [illegible] at Woods Hole [illegible]

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Consultants blend AI, conventional technologies

By John Gallant
CW Staff

CAMBRIDGE, Mass. — At Arthur D. Little, Inc.'s (ADL) Artificial Intelligence Program, there is no such thing as a pure AI system.

According to program director Karl Wiig, researchers involved in the giant consulting firm's current AI-related projects have been successful in merging conventional technologies and advanced AI techniques. Wiig cited the Personal Financial Planning System that the AI program is developing for a large U.S. financial institution.

Wiig said the fully automated system is intended to provide financial guidance — including advice on investment and money management strategies — to individuals with incomes between $20,000 and $70,000. Although the system employs more than 10 separate expert systems embodying the expertise of financial professionals, it also contains a conventional data dictionary and relies on operating services provided by IBM's VM/CMS. Developed in Lisp on a Symbolics, Inc. processor, the system will be delivered in final form in PL/I for use on an IBM mainframe.

"It is a blending of AI and conventional technology," Wiig said. "It uses explicit mathematical models for such things as tax calculations and cash-flow projections. Those are conventional techniques. But the reasoning process that is automated by the system is clearly AI technology. We could not manage that reasoning process using conventional technology."

Perhaps ADL deals in such hybrid systems because the AI program does not solely focus on research. Wiig said the AI program is geared to support ADL clients in applying AI technology and expert systems to their day-to-day operations. Wiig said the goal is to provide applications that leverage clients' existing systems investment or offer a return sufficient to justify investment in AI-dedicated hardware and software.

ADL's AI program has 27 staff members with a variety of backgrounds, including AI and operations research, the social sciences and electrical engineering. The team is currently involved in

CW photo by M. McNally

Wiig

more than 20 client projects, which are supported by a computer laboratory equipped with six Symbolics 3600 and two Xerox Corp. 1108 processors networked to a Digital Equipment Corp. VAX-11/730 used as a file server and network manager.

"We are developing AI- and knowledge-based systems primarily for manufacturing and financial industries," Wiig said. "We have seen that there is really no such thing as a clean, AI-based system, particularly if you plan to use the system in real life. What is interesting about the systems we develop is that we have been able to build the bridges between AI and conventional systems."

Despite ADL's success in linking AI and traditional information systems, Wiig questioned the role that conventional DP departments and professionals will play in adopting AI technology within the corporate world.

"AI works with the knowledge that experts utilize to perform particular tasks. We found that we have to spend a tremendous amount of time trying to structure what happens in that setting," Wiig said. "To build a knowledge-based system, you must lay the [decision-making] process bare and obtain agreement from the experts about what happens. Should the DP shop do that job? Maybe not. We are going to make a number of mistakes if we think of this as a conventional DP activity."

According to Wiig, AI applications delve deeper into the actual managerial operations of a company than do traditional information systems, which often deal only with easily accessible surface data. "Information systems do not work with the private psychology of the individual," he said.

Wiig said a number of large corporations have already organized in-house AI laboratories or departments outside the DP environment. "I am sure that will create conflicts," he said. "It is an invasion of turf, so to speak. There will be a need for some adaptation on both sides."

Where possible, Wiig acknowledged, the bridge between AI and information systems should be fostered — at least for the time being.

"It is absolutely desirable to propogate the [AI] capabilities in environments that consist of IBM mainframes and [DEC] PDPs as long as the task, computationally, can be done," Wiig said.

AI technology can also benefit small firms

The cost is justified when the need exists

CAMBRIDGE, Mass. — "Companies are missing the boat when it comes to artificial intelligence."

Helen Ojha, an expert systems design specialist with Arthur D. Little, Inc.'s Artificial Intelligence Program here, said she feels that is a valid criticism of most organizations.

"Business is changing," she said. "We are now in a period of incredibly rapid change. New people are coming into companies; older, experienced people are leaving. There is often no in-depth understanding of a company's operations. Without that understanding, a company cannot grow in today's business environment. AI and expert systems can stimulate understanding of an individual company's operations and the evolving industry."

CW photo by M. McNally

McArthur

Despite the high cost of AI-related hardware and software, both Ojha and colleague Robert McArthur, also an expert systems designer, said they believe even smaller companies can afford to take advantage of AI technologies.

Purpose for purchasing

"It is not a question of whether a company can afford to apply the technology," Ojha said, "but whether it can come up with the correct purpose for pursuing it. It is not the kind of technology you can invest in without careful business planning, which pays attention to the way knowledge is used within the company."

One critical problem, McArthur said, is that companies often try to apply leading-edge AI techniques that are irrelevant to their needs and that take years to implement.

"When we were just starting out here, some of the AI gurus said we were applying techniques that were old hat. So what? What we were doing was very useful. Companies do not need to be state of the art to be successful in implementing some of these AI technologies," he maintained.

Successful strategy

McArthur said a successful AI implementation strategy involves some immediate, if not overwhelming, payoff.

"You have to work first on things that show some benefit immediately to upper management," he said.

"One of the rules of thumb with the projects we work on is that people be able to use the system in some small way almost immediately."

— John Gallant

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Wang to halt manufacturing for two weeks

LOWELL, Mass. — Wang Laboratories, Inc. confirmed last week that it will shut down U.S. manufacturing operations during the first two weeks of July to bring inventories closer in line with demand and to save on operating costs.

Wang spokesman Peter Connell said Wednesday of last week that employees were asked March 15 to schedule their vacations for the July shutdown. Employees will be allowed to borrow against future vacation time, but those declining to take present or future vacation time will have to take an unpaid two-week leave, he added.

Earlier this month [CW, March 18], Wang announced that revenue growth for the current quarter is expected to be only 10%, and profits for the fourth quarter and fiscal year ending June 30 will probably be less than those for the year-earlier periods.

During a press briefing last Tuesday, at which no mention was made of the scheduled production shutdown, Wang President and Chief Executive Officer John Cunningham said he expects an industrywide slowdown in orders to last as long as nine to 12 months.

Cunningham said Wang has experienced slower growth in all product areas and across all distribution channels, although VS series products and personal computer products have felt less of an impact than their Office Information Systems products.

Usefulness of micro expert systems called limited

By Eric Bender
CW Staff

CAMBRIDGE, Mass. — Demonstrations on personal computers give a taste of what is possible with expert systems, but the taste may be misleading, cautioned artificial intelligence specialists at Arthur D. Little, Inc. (ADL) here.

While most of ADL's expert systems work involves creating systems with large knowledge bases that run on more powerful machines, the consulting firm has found a role for prototype software on personal computers.

One demonstration that examines political risks in various countries establishes "a very compelling dialogue" with users, according to Dennis Barlow, a consultant who has worked on numerous AI installations.

But risks crop up when clients who are sophisticated about computers and operations research look at a demonstration expert system on a micro. They are seeing only a very limited subset of what expert systems can do and may not be properly impressed, said ADL's James Davis, who specializes in knowledge-based systems.

A "serious" system with 1,000 production rules needs a large machine, while a personal computer might effectively handle only about 50 rules, Barlow said.

Knowledge-based software is very resource-intensive, and personal computers lack both sufficient memory and processor power to handle significant programs, commented Lawrence Brenkus, another ADL consultant who works with medical applications. And while micro versions of Lisp and Prolog are available, performance is further limited because the versions are interpreters rather than compilers, he said.

The programs currently available on micros could be generated without an AI language, Davis added. "Anything you could develop in Prolog or Lisp on the personal computer, I could develop in C or Basic, and it would run faster."

Another alternative is to create programs within a full-blown AI development environment and then hone them down "until you finally have something that works on the personal computer," Barlow said.

Barlow

However, personal computers do represent a promising delivery vehicle for educating programmers about expert systems, the specialists agreed.

Micros can provide an inexpensive introduction for programmers, who often find AI languages rather strange, Brenkus pointed out. Initially, many find Lisp "something of a headache," he said. "You don't even know where things are stored — you're using source code for storage."

Another role may appear as some expert systems evolve into "real distributed knowledge systems with high-speed communications links," Davis predicted.

In this setup, "the big processor would have the bulk of the knowledge, and some of the knowledge could be siphoned off to the personal computer," Barlow said. A machine like the IBM Personal Computer AT might prove very suitable as a front-end device, handling graphics manipulation or other tasks, he suggested.

But today, users should beware "if anyone comes up and tries to sell you a floppy disk as an AI tool," Barlow summed up. "Anything on a floppy is not true AI."

Davis, however, pointed out that this boils down to a question of definitions and asked "how can you have 'false' artificial intelligence?"

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NEWS

Word processor, software herald Burrough's OA thrust

By Charles Babcock
CW New York Bureau

NEW YORK — Burroughs Corp. last week made a thrust into office automation by announcing a word processing system and an OA software package for its mainframes and dangling the promise of an IBM-compatible document exchange architecture by the end of the year.

The word processing system, the Ofiswriter 25 (OW 25), combines Burroughs' B25 microcomputer hardware, a keyboard with 14 keys added to the standard microcomputer arrangement and word processing software. The software comes in two packages: one for general-purpose, managerial word processing and one for secretarial word processing, said Robert F. Holmes, president of Burroughs' Worldwide Marketing Organization.

The mainframe software, Office Management System II (OMS II), runs on Burroughs mainframes, including the recently announced A Series, and is said to allow document exchange and other communications between a mainframe and terminal. It is available in electronic mail, document management, workstation integration, networking, form letter format and electronic calendar modules. The modules can be run separately or together, Holmes said.

Burroughs' Document Format Architecture (DFA) was designed to be compatible with IBM's Document Content Architecture and Document Interchange Architecture (DCA/DIA). It is said to allow a Burroughs system to interface with the Document Interchange Format. The company intends to build the handling of compound documents — which may be composed of text, data, graphics and image and voice information — into DFA, Holmes said.

A company spokesman claimed that DFA will be compatible with systems from Digital Equipment Corp., Wang Laboratories, Inc. and any other manufacturer that has announced it will use IBM's DCA/DIA as its communications interface.

The entry-level OW 25 word processing system is priced at $8,070 and includes Intel Corp. 80186-based B25 hardware; the Btos proprietary operating system, capable of calling up MS-DOS and CP/M operating systems as application programs; 512K bytes random-access memory; a 1M-byte floppy disk; a 10M-byte hard disk; and word processing software. Deliveries will begin in April, the company said.

The first two modules of OMS II software, the document manager and electronic mail, will be available in April for $8,500 on the Burroughs B1900 and A3 of the A series small-scale mainframes. It will be available the same month for $10,000 on the B5000 and B7000 series and A9 large-scale processors. It will be available in May for $10,000 on the B2000 and B4000 medium-scale processors.

No pricing has been set yet for DFA, said James A. Ekholm, senior marketing manager for OA systems.

> *Burroughs officials made clear that the announcement was meant to signal the company's commitment to OA.*

Burroughs officials made clear that the announcement of the three products was meant to signal the company's commitment to OA. Holmes cited Burroughs' installed base of 10,000 OW 400 word processors, established over the last three years since it acquired Redactron, a former word processor manufacturer, and its installed base of 100,000 B25-based workstations.

Sixty percent of Burroughs' customers are data base and data communications users, making them OA candidates, Holmes added.

Opinion was divided among OA market observers on whether the Burroughs moves indicated it could become a successful OA player.

One group said no: Burroughs' announcements were purely a defensive strategy to prevent any more losses in its own customer base. A second group said Burroughs might be able to repeat its workstation success with the OW 25 system.

"[Burroughs'] workstation-oriented products could establish a beachhead for them," said David L. Cushing, associate director of the Omni Group Ltd., an OA market research firm here. Many of the 100,000 B20 and B25 workstations Burroughs has sold have been purchased by small businesses that are non-Burroughs sites, he noted.

Melody M. Johnson of Cable, Howse & Regan, an investment banking firm in Seattle, cited OMS II software as very useful to Burroughs customers and said the need of many businesses to upgrade typewriters to word processors could bring Burroughs new customers. The key will be later product offerings, she said, particularly DFA. "A lot of people will want to wait and see how well that architecture integrates IBM, [Apple Computer, Inc.] or whatever," she noted.

ORDERS from page 1

Model JX] to two [3080 Model KXs] next summer. I can't visualize why [the computer companies] are experiencing slower growth."

The banking industry, however, is apparently singing a different tune. "Speaking for a lot of banks, I think there has been a general recognition that we've got to take a real close look at our operating costs," said Ed Nyce, senior vice-president of corporate systems and staff services at Manufacturers Hanover Trust Co. in New York. "We built a significant amount of capacity in 1983 and 1984, positioning ourselves to ride out until the IBM Sierras [3090 Model 400] arrived. There is a determined break in our acquisition plans while we await them."

Thomas Ardell, DP manager at John Deere Co.'s Portland, Ore., facility, said he is following a similar type of Sierra-based cycle. "[Demand] is definitely cyclical," he said. "Our needs are dependent upon the Sierra processing line, but it's not due for 18 months. I think lots of businesses are just making do with what they have until it's delivered."

Some corporate DP users reported a slowdown in the growth of orders because, like Manufacturers Hanover, their acquisitions in the last several years have satisfied their DP and MIS needs.

"If you've done a lot of new things [recently], your organization needs time to absorb that," said Eleanor Luce, MIS director of the Olin Corp. in Stamford, Conn. "You can't go flat out forever. Once you make that decision, that might have the lag effect of order deferral three to five months down the road."

'Vendors becoming victims of optimism'

One DP executive at the nation's second largest insurance firm suggested vendors are becoming victims of their own optimism. "I believe their forecasts were maybe too ambitious," said Dan Cavanagh, vice-president for DP at New York-based Metropolitan Life Insurance Co. "Is that an industry downturn or just their projections?"

Cavanagh said there has been no slowdown at Metropolitan Life, which is continuing with plans to add two new mainframes and about 1,000 terminals or workstations per year. "We need an awful lot of storage," he said. "That's where we see the explosion continuing."

Demand for more research data continues to fuel new acquisitions of DEC minicomputers at the New York-based pharmaceutical firm of Pfizer, Inc. "Our capital acquisition plans have increased beyond what we thought they would be a year ago," said Jack Cronin, Pfizer's corporate information services director.

The DP auditor for a Maryland health insurance firm admitted the demand for mainframe systems may have slowed but added that the industry's needs for micros and networking equipment will continue to grow.

"Here, and at two other large insurance firms that I know of, ordering is on or ahead of schedule," said William Rider of Blue Cross/Blue Shield of Maryland, Inc. in Towson, Md. "CPU-wise, we'll maintain for awhile; the immediate future is more for peripherals. With the trend to local-area networks, I can't see any large company surviving by just maintaining its current system or slowing down."

Many computer industry analysts believe fears of a 1985 recession have dampened industry's demand for DP power. But according to Bob Hammer, DP manager of the Caterpillar Tractor Co. plant in Joliet, Ill., hard-hit industries still need computers, particularly in computer-aided design and manufacturing applications on the factory floor.

"Our sales have been down, but to be competitive worldwide, we've still got to modernize," Hammer said. "We're playing catch-up with the automotive industry as it is. When times are good, people want systems; but when times are bad, they still want systems."

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Lotus says further testing will prompt delay in Jazz delivery

CAMBRIDGE, Mass. — Lotus Development Corp. last week announced that shipments of Jazz, its integrated productivity software for the Apple Computer, Inc. Macintosh 512K-byte personal computer, will be delayed until May 27. When Jazz was formally announced last November, the $595 package was scheduled for delivery in the first quarter of this year.

However, development "has required an unusual number of engineering refinements and rigorous testing," said Lotus Chairman Mitchell Kapor, who has often publicly criticized other software firms for not meeting their promised delivery schedules.

The program reportedly has crashed in several recent previews for user groups.

Jazz combines word processing, spreadsheet, graphics, data base management and communications functions.

NEWS

OMB sets guidelines for federal information systems

By Mitch Betts
CW Washington Bureau

WASHINGTON, D.C. — The U.S. Office of Management and Budget (OMB) has drafted a policy document titled "Management of Federal Information Resources" that will require federal agencies to manage their information processing activities in a more businesslike manner.

The wide-ranging document, called an OMB circular, sets new information management policies for security, connectivity of computer systems, software, DP planning, training, end-user computing, electronic filing and the dissemination of information from government data banks.

The OMB issued the draft circular March 15 and is soliciting public comments on the draft before making it a final, mandatory policy for federal agencies. Comments are due May 14.

> *The OMB policy requires that federal agencies, when disseminating government statistics and other data to the public, rely on commercial vendors to the maximum extent possible.*

One controversial aspect of the OMB policy is a requirement that federal agencies, when disseminating government statistics and other data to the public, rely on commercial vendors to the maximum extent possible. "For example, before an agency establishes a service for electronic dissemination of government information via an on-line computer system, the agency should compare the cost of contracting for operation of the service [with] in-house performance and determine whether in-house performance is less costly," the OMB said.

This position is supported by the Information Industry Association here, but the concept has been questioned by librarians and academics, who argue that it will restrict the free flow of federal information to the public.

Other highlights of the OMB draft circular include the following new information system policies:

- Agencies must establish multiyear strategic plans for acquiring and operating information technology.
- Agencies must document the cost-effectiveness of information systems, foster the interconnectivity of DP systems, minimize the life-cycle costs of information technology and use off-the-shelf software unless customized software is more cost-effective [CW, Feb. 25].
- Agencies must train end users in their responsibilities for computer security, records management and protection of privacy.
- DP capacity requirements should be met through interagency sharing and from commercial sources before acquiring new capacity. Agencies should share spare capacity to the extent practicable.
- Agencies are directed to develop procedures that provide for timely acquisition of information technology.
- Agencies should avoid forcing program managers to use "monopolistic" central computer centers and give them the freedom to seek DP services elsewhere if that is cost-effective.
- Agencies are encouraged to develop electronic filing and retrieval systems but should give particular attention to such issues as privacy, public access, records management and cost recovery.
- Agencies must economize on the collection and dissemination of government data by conducting only those activities that are essential to agency missions and by relying on the private sector.

Alarming vulnerability of systems

The new OMB policy puts special emphasis on information security because of the alarming vulnerability of government computer systems, the document said, adding that security is "first and foremost a management issue and only secondly a technical problem of computer security."

The management office defined information security as "both the protection of information while it is within the systems and also the assurance that the systems do exactly what they are supposed to do and nothing more."

The growth of end-user computing has "increased the vulnerability of federal information systems and hence the level of management concern," the OMB document said. "Protecting personal, proprietary and other sensitive data from unauthorized access or misuse; detecting and preventing computer-related fraud and abuse; and assuring continuity of operations of major information systems in the event of emergency-related disruptions are increasingly serious policy issues," the OMB added.

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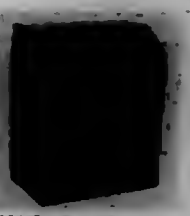

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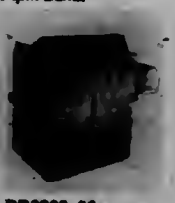

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SEC's Edgar project a 'boondoggle,' legislators claim

By Mitch Betts
CW Washington Bureau

WASHINGTON, D.C. — In a blistering attack on the U.S. Securities and Exchange Commission's (SEC) experimental electronic filing system, U.S. legislators recently charged that the SEC system has been a mismanaged "boondoggle" and that it lacks the capability to retrieve important financial data.

Rep. John D. Dingell (D-Mich.), chairman of the House Committee on Energy and Commerce's Subcommittee on Oversight and Investigations, opened the March 14 hearing with the statement, "We have discovered disturbing evidence that the SEC's bold move [into electronic filing of corporate documents] may have become a blind stumble."

After five hours of criticism from congressional investigators and private industry, SEC officials denied virtually all of the allegations and said the Electronic Data Gathering and Retrieval system (Edgar) pilot project is working well. SEC Chairman John S. R. Shad criticized the subcommittee for holding what he called an unfair and unobjective hearing, to which Dingell shouted, "That's none of your business!"

Since Sept. 24, 144 companies have voluntarily submitted annual reports, proxy statements and other securities documents to the SEC in electronic format. The documents are available for inspection at public terminals, and can be analyzed by the SEC enforcement staff.

Last year the SEC awarded a $9.2 million contract for the two-year pilot program to Arthur Andersen & Co., an accounting and management firm, with IBM and Dow Jones & Co. as subcontractors.

Numerous charges levied

Dingell and Reps. Gerry Sikorsky (D-Minn.) and Ron Wyden (D-Ore.), citing investigations by the subcommittee staff and the General Accounting Office (GAO), levied numerous charges against the SEC's management of Edgar.

The legislators said Edgar is a "cost overrun" project because the $9.2 million contract price was higher than the $6 million estimate provided earlier to the House Appropriations Committee. SEC officials said the earlier estimate was the best available at the time and that the only cost increase in the contract has been $290,000 for a hardware upgrade, from an IBM 4341 to an IBM 4381.

The legislators also charged that the Edgar system is little more than a "glorified microfiche" system because it lacks data-tagging features that permit retrieval of specific financial data from the data base. The GAO reported that the contractor had dropped the development of automatic-tagging software from the pilot program. Because the SEC did not require corporate filers to submit data in standard formats, Arthur Andersen planned to develop software to tag automatically important financial data — such as profit-and-loss figures — in nonstandard filings, the GAO explained.

SEC officials said that because of unexpected difficulty in developing the data-tagging software, that feature will be postponed but has not been eliminated. SEC officials strongly objected to the assertions that Edgar is a glorified microfiche system, claiming that it has electronic mail, access to outside data base services and word processing and soon will have text-search capability.

The legislators also charged that the SEC rushed the contracting process to meet an arbitrary Sept. 24 starting date. "The SEC's rush to judgment didn't serve the public," said Wyden, referring to an abbreviated, 60-day contract-bidding period that elicited four bidders.

"I felt that [starting] date must be made," responded Kenneth A. Fogash, deputy executive director of the SEC. He said the SEC had a sense of urgency about starting the Edgar pilot at the promised time because it wanted to establish credibility with the securities industry and the volunteer filers.

Representatives from the Information Industry Association here also questioned whether the Edgar project — the government's first electronic filing system — should have been subject to an accelerated design and contracting process. "Truly, Edgar represents a great and bold leap. For this reason, we feel the schedule was too tight," said Peter Marz, the association's general counsel.

The critics also questioned the propriety of awarding the contract to Arthur Andersen because the firm audits many companies that report to the SEC and could benefit from inside knowledge of the Edgar data base.

Miti drops plan to limit copyright

TOKYO — The Japanese Ministry of International Trade and Industry (Miti) last week dropped its proposed plan to limit software copyright protections in the face of heavy pressure from U.S. government and industry, which feared Japanese firms would copy valuable mainframe operating system software.

Miti revealed to a U.S. trade negotiating team that it was dropping the year-old proposal and that it is also seeking to open up Japanese telecommunications markets when the government-owned monopoly of Nippon Telephone & Telegraph Corp. is deregulated April 1 [CW, March 4].

William Brock, chief of the U.S. Trade Representative's office, commented, "It is of major importance that Japan has recognized that copyright is an appropriate form of protection for software."

Miti's original plan called for software programs to be fully registered with the ministry, then these programs would enter the public domain after only 15 years, rather than the 50 years required for copyrighted products.

Additionally, Miti sought a provision to order the sale of software programs to third parties if the product carried significant market power.

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Gene Amdahl

At 62, Gene Amdahl is one of the computer industry's elder statesmen. During a career spanning 30 years, he played a leading role in the architectural design of the IBM 360 in the 1960s and went on to pioneer a new market in 1970 with Amdahl Corp., the first manufacturer of IBM plug-compatible mainframes.

Still reaching for the brass ring, Amdahl in 1980 started Trilogy Ltd. in Cupertino, Calif., and proposed to build a large-scale, IBM-compatible supercomputer built around revolutionary wafer-scale semiconductors.

Based on Amdahl's track record, the forecasts for the company were dazzling. Amdahl and his management team were able to raise a total of $276 million in investments from corporate luminaries like Sperry Corp., France's Bull, Digital Equipment Corp. and others, including the Irish government, thus becoming Silicon Valley's largest start-up.

But since then, Trilogy's ambitious plans have nose-dived. The task of developing wafer-scale technology proved exceedingly complex, and by early 1984, the company conceded it had run up against technical difficulties that subsequently caused it to cancel the semiconductor and supercomputer projects. The firm now has no major source of income and must support its corporate headquarters and well-equipped semiconductor plant. About $85 million remains of the $276 million raised.

In an interview this month with Computerworld's West Coast correspondent Kathleen Burton at Trilogy headquarters, Amdahl discussed the company's problems, claiming that if events had turned out differently, "the world would have been changed."

Q *Trilogy's product strategy focused on developing wafer-scale technology. In light of the tremendous heat dissipation problems that subsequently developed, was this technical goal feasible? Were you attempting to accomplish too much?*

No. The wafer-scale technology is absolutely feasible, though now it's out of our reach financially.

We came extremely close. The main problem was not heat dissipation or wafer meltdown problems — in our design, there was no path for current flow in significant amounts — but a [short-circuiting] problem in the chip's upper layer. We cleared that up within three months and then discovered that we needed faster conductivity because of the chip's long path lengths.

As a result of these discoveries, a second pass at the chip was required, and the amount of money we had left just wouldn't carry us there. We needed twice as much money as we had. The areas that needed improvement were workable, but they weren't workable economically by that point.

Q *Your son Carlton, Trilogy's ex-vice-chairman and chief scientist, said in a New York Times article last July that no one in the company's upper management understood the enormity of the development task. Is that accurate?*

Yes. Because of the scope and complexity of the development task, we found that almost everything had to be done differently at that scale. To someone looking at it initially, the task looked a third as large as it really was.

Our projections were way off. It was out of our control. If you look at something that is well solved today, you find that carrying it out to its numerical increase causes you to run into limitations. That's what happened to us.

Q *In January 1984, Trilogy acknowledged problems with the wafer and later acknowledged other problems that led to canceling the mainframe and wafer projects. When did you first realize that serious problems existed, and why did the company deny that the problems were so serious?*

We didn't deny that our problems were serious, but keep in mind that a premature announcement of a problem can damage a company's stock as much as a delayed announcement [can]. We first began observing a serious shorting problem in late December 1983 and told the public in January 1984 as soon as we knew what the problems were.

We resolved the shorting difficulties within three months but then discovered other less obvious problems. That's when we decided we needed two more full passes for the chip design that would have taken one and a half years [longer] than we originally thought. That's when we canceled the [supercomputer].

We subsequently canceled wafer scale when we came to the conclusion that no other users, unless [they were] doing a very small system, would ever get [the product out] early enough either. It all takes money, and at our run rate, you didn't need to be out very far before you recognized that the money was gone.

Q *How would you characterize Trilogy's problems — technological, managerial or a combination of both?*

The problems were a combination of technical and managerial. [More than] half of the technical problems were a result of not having adequate coordination and communication at the managerial level. It was as if two people were building a bridge at night with no communication between them; you'd probably observe a bump at the joint linking the two ends when the project was finished. That's what it was like.

The technical problems weren't insoluble but were the consequence of solving problems and finding out that the solutions didn't match the original plans.

Q *You raised approximately $280 million [in capital investments] — $50 million from R&D partnerships, $55 million from an initial public offering, $115 million from a private stock offering, $10 million in overseas plant financing from the Irish government and more than $50 million from computer equipment lease financing. Most of these investments were based on your reputation and your vision of undeveloped products. Did you oversell Trilogy's potential?*

I don't think I oversold the potential of the technology, but I think I may have oversold our ability to put together everything it took to do it. As it turned out, the overall complexity of the computer, when you go into it, was too great, but had it been successful, the world would have been changed.

I think that Trilogy's prospectus took a very close look at the company and gave potential investors the best estimate we could make at that time of what lay ahead of us.

Q *Trilogy's elaborate facilities have been characterized by some as being a modern-day Taj Mahal. What can we infer from that about the company's attitude toward costs, in general?*

The section everyone always remembers about Trilogy's facilities is this one administrative section, which is only about 5% of our total operation. It was done this way to overcome a problem we ran into at Amdahl. Our facility there made us look like a small company with limited resources, and consequently, everyone who walked in the door was concerned about Amdahl's survival. This section at Trilogy was done this way to provide visual cues to visitors to suggest just the opposite.

Also, the things we were trying to do here required technical support and very expensive equipment, or there wasn't a chance. Chip development costs are soaring today. I read recently that it costs [Intel Corp.] $10 million to develop a 64K-byte chip and $100 million to de-

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WASHINGTON UPDATE
Mitch Betts
CW Washington Correspondent

Federal EFT to require NBS-approved security

WASHINGTON, D.C. — By 1988 all federal government electronic funds transfers will have to be properly authenticated or electronically sealed using approved standards, according to a recently signed agreement by the U.S. Department of the Treasury, the National Security Agency and the National Bureau of Standards (NBS).

The federal government annually accounts for $500 billion in collections and payments and the electronic transfer of $2.5 trillion in federal funds, according to the U.S. Department of the Treasury.

The security system will be developed using technical guidance from the National Security Agency and the NBS, which will oversee the design of electronic funds transfer devices.

"The stakes are extremely high," commented James H. Burrows, director of the NBS Institute for Computer Sciences and Technology. He said the NBS will work with the private sector to help protect financial networks that are based on electronic funds transfers.

A Treasury Department directive issued earlier this year specifies that federal EFT payments be electronically sealed using the NBS Data Encryption Standard.

The Treasury plans call for the agency to maintain an automated system for managing the cryptographic keys that will be required to open the EFT transaction once it has been sealed.

One feature of the proposed automated system will notarize the key with the names of the transmitter and intended receiver, according to NBS. The key management standard it is proposing for the Treasury Department payment systems is now going through the final approval process necessary before the standard is adopted by the Amerian National Standards Institute.

College computer centers lack adequate equipment

WASHINGTON, D.C. — According to a recent National Science Foundation survey of universities, 93% of university computer science departments reported that they are unable to conduct critical experiments due to a lack of modern equipment.

Furthermore, top computer department personnel reported that roughly 40% of their equipment is inadequate for use by university researchers, and only 17% of the equipment could be considered state of the art.

The survey covered 91 computer science departments and facilities for the year 1982. The report, "Academic Research Equipment in the Physical and Computer Sciences and Engineering," is available from the Division of Science and Resources Studies, National Science Foundation, 1800 G St. N.W., Washington, D.C. 20550.

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AMDAHL from page 15

velop a 1M-byte [random-access memory] chip, and the company already has an infrastructure, integrated management and a customer base that start-ups like us didn't have. This would add another $150 million to $200 million to that figure.

Q *Did all that up-front cash give you the illusion that you had more money than you really possessed?*

No, but I think the money made us grow more quickly than we should have grown.

> *'We needed twice as much money as we had.'*
>
> — Gene Amdahl
> Trilogy Systems Corp.

Q *Three times you've wrestled with history: developing IBM's 360 mainframe and then starting the plug-compatible mainframe market at Amdahl. In light of recent events at Trilogy, how would you assess your standing as an entrepreneur in the eyes of potential investors. Has that changed from two or three years ago?*

I don't know. I haven't tried dipping my toe in the water. I bet I could probably raise investment moneys about as well as most people starting out for the first time.

Q *In the past, you've expressed bitterness toward IBM. Are you driven to upstage IBM continually? What is the genesis of your long-time attempts to do battle [with] IBM?*

My concern about IBM is that it will destroy the U.S. electronics industry with its insatiable hunger for growth. I don't think that's in the best interest of the people in the U.S. I think introducing competition is the most significant contribution you can make to the American public. For example, the price/performance on mainframes kept increasing until Amdahl came in and made inroads against IBM so that IBM had to drop [its] price/performance offering by a factor of three.

Q *What about Trilogy's future?*

We're looking at products with an early revenue potential. It's time [that] we're working against. Our resources won't last forever.

U.S. to use program to audit federal employees' calls

By Mitch Betts
CW Washington Bureau

WASHINGTON, D.C. — The U.S. government plans to use a computer program to catch federal employees who are making personal, long-distance calls on government telephones, a government spokesman said last week. These computerized audits are worrying privacy advocates, who said the audits could be used to catch government whistle-blowers.

The telephone audit will be conducted by the inspectors general at federal agencies and will use software that can spot suspicious, frequently dialed numbers and note high-cost calls on monthly phone bills, according to a spokesman for the U.S. Office of Management and Budget (OMB).

The audit will be conducted for an indefinite period under the auspices of the president's Council on Integrity and Efficiency, composed of 17 inspectors general and headed by Joseph J. Wright Jr., deputy director of the OMB.

In a letter sent to Wright last week, Reps. Don Edwards (D-Calif.) and Patricia Schroeder (D-Colo.) expressed concern about the program's effect on civil liberties. "This proposal, however well-intentioned, raises the specter of Big Brother government at its most ominous," they wrote.

"While we would wholeheartedly support appropriate steps to cut down on misuse of the federal telephone system, we fear that the monitoring program under consideration may lead us into areas where the dangers far outweigh potential budgetary savings," the representatives stated in their letter.

Edwards and Schroeder asked Wright to respond to specific questions about the program, including queries about how the analyses would be used, who would have access to them and how to guarantee that the program would not be used to discourage whistle-blowers or to stifle dissent.

> *'This proposal, however well-intentioned, raises the specter of Big Brother government at its most ominous.'*
>
> — U.S. Reps. Don Edwards and Patricia Schroeder

Jerry Berman, legislative counsel to the American Civil Liberties Union, said the audit will have a potentially chilling effect on government whistle-blowers and will create a climate of distrust among personnel in the workplace.

The OMB spokesman said the inspectors general do not intend to use the program to discourage whistle-blowers or otherwise invade worker privacy.

He said the administration is exploring ways to program safeguards into the software itself. Government auditors suspect that perhaps 30% to 40% of all telephone calls from federal offices are personal, he said.

The audit, to begin sometime after April, will search for "patterns of abuse" in long-distance calls only, by examining one out of every five calls placed through the government's intercity Federal Telecommunications Service and investigating all calls placed through commercial long-distance carriers, the OMB spokesman said.

He said the government's long-distance phone bill approaches $500 million a year. "If, in fact, we could make a 10% reduction [in personal calls], $50 million is worth going for," he said.

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NEWS

Students linking math with computers shine in contest

By Dennis Rainwaldt
CW Staff

WASHINGTON, D.C. — High school students who combined mathematics with computers took the first and third places in the 44th annual Westinghouse Science Talent Search here recently.

The contest, which boasts five Nobel Prize recipients among its former winners, began in 1942 and is sponsored by Pittsburgh-based Westinghouse Electric Corp. and Science Service, Inc. here, said Christopher C. Newton, Westinghouse's public relations manager in New York. This year, 1,069 students from around the U.S. entered the contest, he said.

Alan John Hu of La Jolla, Calif., walked away with the $12,000 first-prize scholarship for his method of speeding the location of information in a specific computer file. He said he derived a mathematical formula into which constants could be plugged to optimize searches of magnetic tape by using a combination of binary and sequential searches.

"I've been messing around with computers since third grade," Hu said. A trip to the library or 15 minutes with pencil and paper usually would solve the little problems that popped up, he said. But when he came across the idea of wasted search time and movement, Hu said he could not find references to it in the library and could not work it out easily. The project ended up taking 1½ years, on and off, he said.

> *Using an IBM micro, Friedman proved an odd perfect number with eight prime factors has to be larger than 10^{79}.*

The third-place winner was Michael Friedman of Brooklyn, N.Y., a senior at Stuyvesant High School in New York. Friedman set out to find a lower bound for an odd perfect number with eight prime factors. Using his IBM Personal Computer at home, he proved that if an odd perfect number with eight prime factors exists, it has to be larger than 10^{79}.

The field of applicants was narrowed to 40 finalists who were each interviewed by eight judges, Newton said. The winners were students the judges deemed the most creative thinkers, he added.

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Dexpo set for late May

NEW ORLEANS — The seventh national DEC-Compatible Industry Exposition, Dexpo South '85, is scheduled to be held from May 28-31 at the New Orleans Superdome.

Sponsored by Expoconsul International, Inc., Dexpo South '85 will provide vendors of Digital Equipment Corp.-compatible merchandise with the opportunity to present their products to OEMs, systems integrators, dealers and DEC users.

The dates of Dexpo South '85 coincide with the annual DEC Users Society conference in New Orleans.

The registration fee for the exposition is $10. Exhibition space is priced at $18 per square foot.

For more information, Expoconsul International is located at 55 Princeton-Hightstown Road, Princeton Junction, N.J. 08550.

Maintenance meet slated

DALLAS — The Education Foundation of the Data Processing Management Association and Sigma, the special interest group of DPMA on software maintenance, will cosponsor the third National Conference on EDP Software Maintenance May 6-8 at the Lincoln Hotel here.

A variety of topics will be covered including software maintenance and corrections.

The conference fee is $715 for DPMA members and $775 for nonmembers.

More information is available from the Conference Manager, U.S. Professional Development Institute, which is located at 1620 Elton Road, Silver Spring, Md. 20903.

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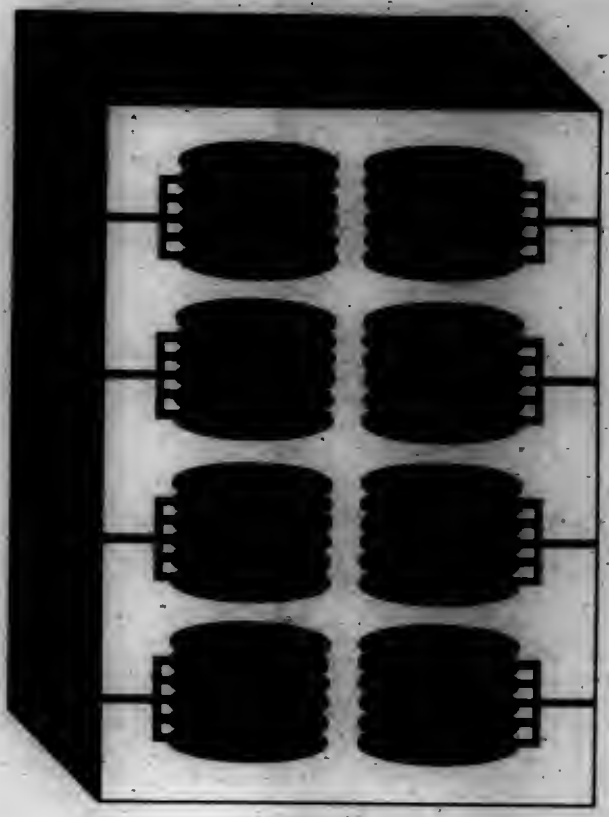

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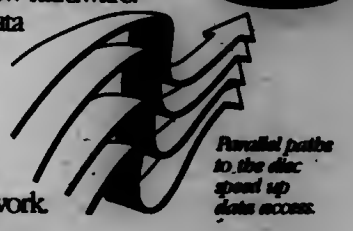

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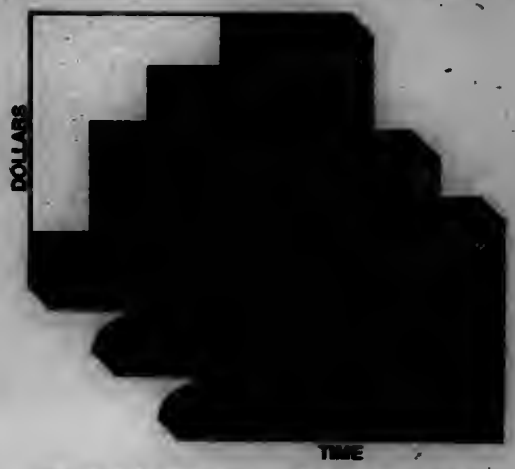

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TANDEM COMPUTERS

Micros playing bit parts in China's high-tech plans

By Wu Zhong
and Li Min Han
Special to CW‡

BEIJING — China does not hope to lead the world in computer technology, nor will it be able to make extensive use of microcomputers at any time in the immediate future, according to an official of China's Ministry of Electronic Industries (Miti).

Xiu Zhen, vice-chairman of the computer department at Miti, recently voiced these sentiments at "Products in China's Electrical Industry," a month-long exhibition that Miti sponsored here.

In terms of computers, China needs large systems to "speed our commitment to modernization," Xiu said.

Xiu said that any micro developments will have to be ancillary to large-scale industrial, governmental and military uses.

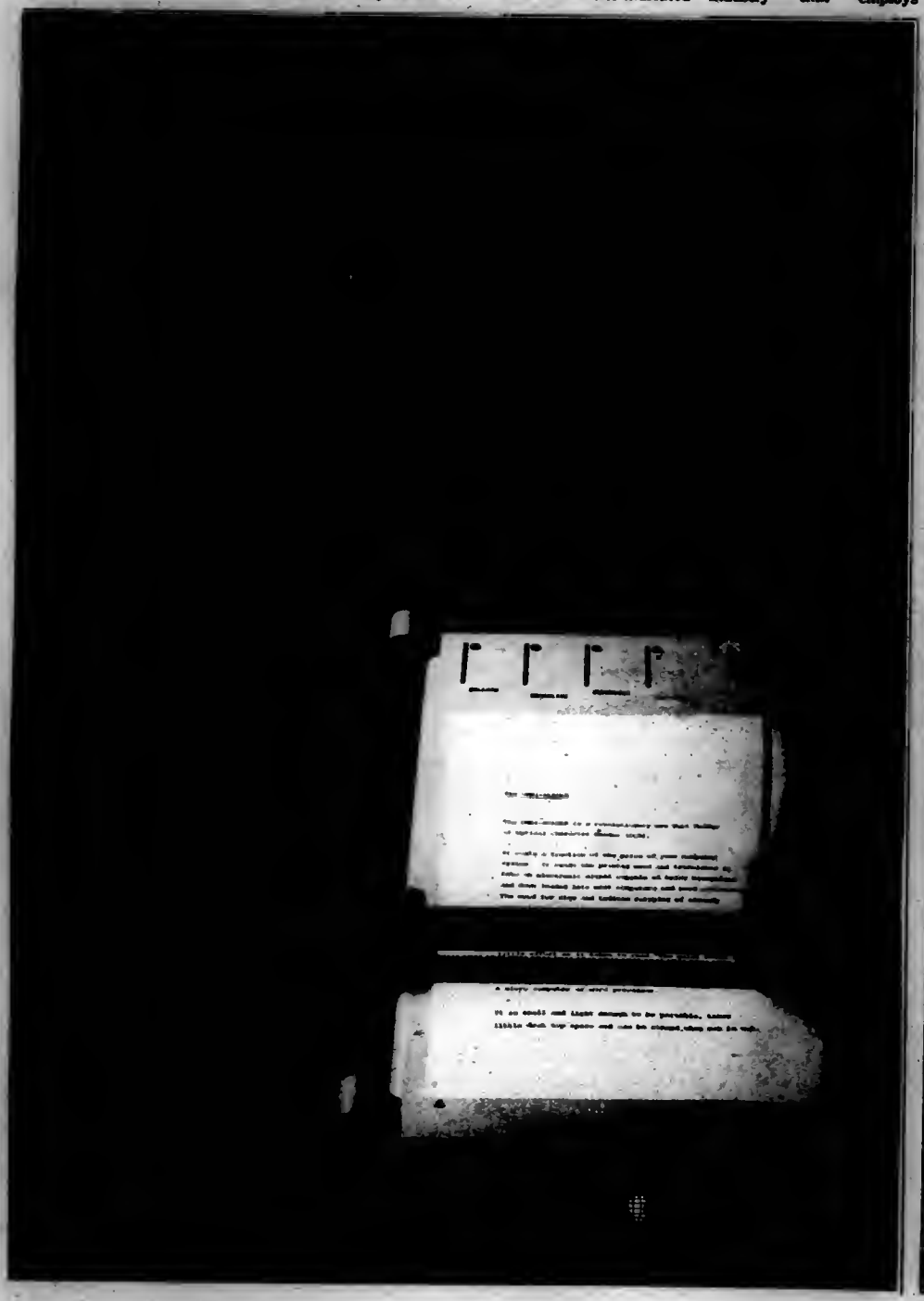
According to Xiu, even the cheapest of the personal computers still costs more than two years' salary for most Chinese professionals. Few micros were found at the Peking exhibition.

Recent statistics indicated that roughly 4,000 large- and mid-range computers and about 10,000 minicomputers now operate in China. "But China is still 10 to 15 years behind the world's advanced levels in integrated circuits and computer technology," Xiu admitted.

In a country with one billion people and an electronics industry that employs 1,300,000, Xiu is not worried that the computer might take away jobs.

"China needs the computer to do new work that people now are not trained to do," Xiu stressed.

Wu teaches at the Beijing Second Foreign Language Institute in China. Li Min directs the writing program in the English department of the Chinese University of Hong Kong.



Miti show spotlights advances

By Wu Zhong
and Li Min Han
Special to CW‡

BEIJING — The stated purpose of the "Products in China's Electrical Industry," held here recently was twofold: First, it allowed the electronics industry to demonstrate to the Chinese Communist party its many improvements in the four years since the removal of the "Gang of Four" [a group, led by the widow of Mao Tse Tung, which ruled China in the period following Mao's death]; and second, it allowed the industry to encourage the government and the private sector to cooperate in bringing about modernization.

The Peking exhibit was sponsored by the Chinese Ministry of Electronic Industries (Miti).

China's important technological achievements include the facility for processing army requisitions, radio and television communications, the ability to launch satellites, the development of sophisticated aerial surveying equipment and the use of microwave communications.

Computers did not compete successfully for the attention of the masses at the show. The curious could learn what the machines do by reading the large signs posted near each machine rather than by watching them operate.

Instead, the audience [illegible] the latest [illegible] players, tape recorders and TV. There [illegible]

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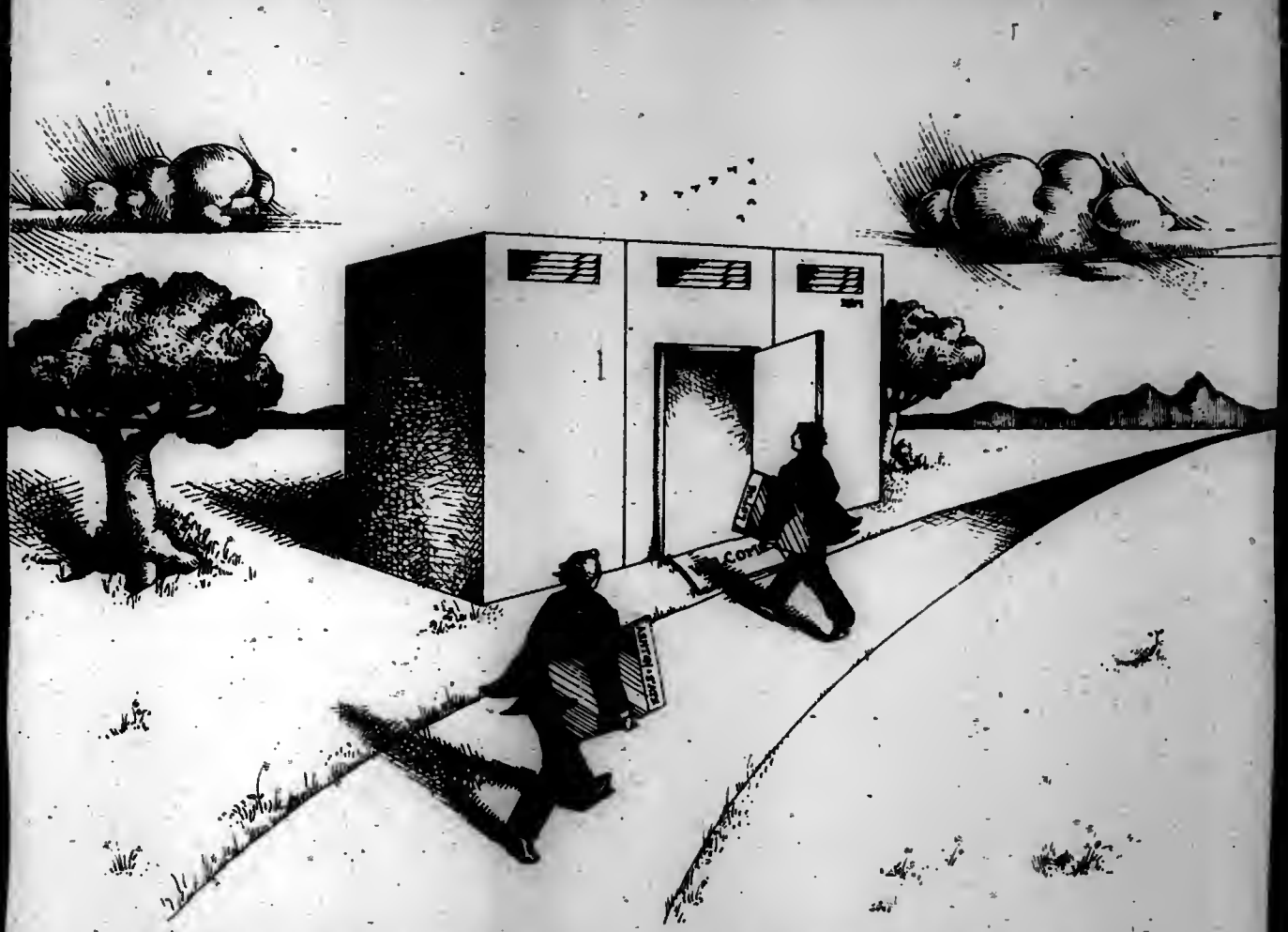

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NEWS

INTERNATIONAL REPORT
CW International News Network

BELGIUM

GHENT — Europe still holds some winning cards in the high-technology game, according to the new chairman of the European Economic Community (EEC), Jacques Delors.

"Europe just needs a more advanced communications infrastructure to build one huge home market with 270 million people," Delors said during the recent Flanders Technology International Exhibition. The EEC is well on its way to creating a "transnational broadband backbone" network, using fiber optics and satellite communications, Delors said.

BRAZIL

BRASILIA — Control of Brazil's Special Department of Informatics, the agency that regulates the information industry here, has changed hands. The new director, Doria Porto, formerly headed the agency's Technological Center.

CANADA

OTTAWA — The Supreme Court of Canada is now hearing appeals by way of a nationwide videotex service. The service, which began March 4, enables the court to hear applications twice monthly from nine cities across the nation.

The service is completely interactive and uses two-way color video and audio links provided through Telecom Canada's Conference 600 service.

FRANCE

PARIS — The Societe d'Etude et Recherche Linguistiques et Informatique (Erli), a leading artificial intelligence company located here, has signed an agreement with Mathematica Products Group, Inc. of the U.S.

Under the agreement, Erli will offer a French natural language comprehension component for Mathematica's Ramis II fourth-generation language and data base management system.

JAPAN

TOKYO — NEC Corp. Vice-Chairman Atsuyoshi Ouchi will share the keynote platform with Zepu Dong, deputy chief engineer of the computer division of China's Ministry of Electronics Industry at the premier Comdex Japan trade show here this week. Ouchi will discuss "Japan and Asia — New Horizons for Small Computers," and Dong will review recent technological progress in China.

NETHERLANDS

AMSTERDAM — Although Paradyne Corp. is facing hard times in the U.S., its business is booming in the Netherlands. Ormas, a leading office automation firm here, has signed a multimillion dollar marketing agreement involving Paradyne's IBM Systems Network Architecture-compatible Pixnet and Pixloop local-area network technology.

SINGAPORE

SINGAPORE — The National Computer Board (NCB) of Singapore will be conducting computer certification examinations this year under the terms of a recent agreement with the U.S.-based Institute for Certification of Computer Professionals (ICCP). The examinations, which test computer competency, will be administered on May 11 and Dec. 7.

SWEDEN

STOCKHOLM — The Scandinavian Committee on Economy and Full Employment has advised the Nordic Ministry Council to grant $1.1 million toward the Nordunet computer-network project. The project's goal is to link all national university networks in Scandinavia. It would eventually enable the universities to access each other's networks as well as data base networks in the U.S. and Common Market countries, a spokesman said.

■

STOCKHOLM — The Swedish electronics industry has shown little interest in Esprit, the European Economic Community's (EEC) $120 million high-technology research collaborative. Many of the Swedish applications for competitive Esprit research were rejected last year, reportedly because EEC officials considered the Swedish efforts half-hearted and sloppy.

WEST GERMANY

FRANKFURT — Standard Elektrik Lorenz AG has jumped on the bandwagon of firms offering digital private branch exchanges. The company, an ITT subsidiary, unveiled two PBX systems for office automation applications, based on the German Postal Telephone and Telegraph digital transmission technology.

UNITED KINGDOM

LONDON — British computer maker ICL Co. will hike hardware prices by up to 8%, effective April 1. The company is blaming the increases on the fall of the pound sterling against the dollar and the yen.

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Model aids firm in evaluation of Nasa shuttle purchase

PITTSBURGH — Astrotech International Corp. (AIX) wants to be first on the last frontier.

The company wants to buy a space shuttle from the U.S. National Aeronautics and Space Administration and contract with Rockwell International Corp. to build new shuttles for use in transporting people and materials back and forth into space as Nasa does now.

AIX is assessing the practicality of its ambition with the help of a software model using Encore! from Ferox Microsystems, Inc. in Arlington, Va.

The model, which runs on an IBM Personal Computer with 512K bytes of main memory, allows AIX to judge whether its financial assumptions are reasonable and whether the numbers justify the project, according to AIX financial analyst Rinaldo Acri.

The Ernst and Whinney accounting firm here helped develop the model, which produces balance sheets, cash statements and cost/benefit analyses based on different assumptions.

The Ferox software was chosen for its features, including tax tables such as the Accelerated Cost Recovery System, which automatically calculates depreciation, Acri said. Encore! also has goal-seeking capabilities, such as the ability to plug in revenues required to produce a 15% rate of return, he added.

Models used in proposal presentation

Initially, models were used to frame the initial proposal to Nasa for commercial operation of the space shuttle.

"The premise is simple. Nasa is poised to move into bigger development projects such as space station design and implementation. But the government doesn't really need the burden of operating space shuttles along with new development. That's where AIX comes in," Acri said. The long-term goal is to buy the entire fleet of shuttles, he added.

The models must show how the government as well as AIX will benefit from the proposal. The company's plan is to lease an existing shuttle and have one built for outright purchase. Since it takes five years to build a shuttle, the company would establish its business around the first, leased shuttle before launching the second, Acri said.

Complex negotiations are in the early stages. Acri said negotiations are now focusing on having Nasa accept a "memorandum of understanding" for how to proceed.

AIX, which had revenues of $100 million last year, owns three subsidiaries, including Special Metals Corp., which develops superalloys; Quasitronics, Inc., which makes computer peripherals and control devices; and Astrotech Space Operations, which processes satellites before launch.

Managing data topic of seminar

NEW YORK — William Synnott, senior vice-president of the Bank of Boston, and William Gruber, president of the Research and Planning Institute, will conduct a one-day seminar entitled "Managing Information Resources for Competitive Advantage" April 25 at the Hotel Parker Meridien here.

The seminar will focus on case studies about companies using technology as a competitive weapon. The speakers will address five critical success factors for information resource management: business and systems integration; planning for competitive advantage; building an information resource management architecture; end-user computing leadership; and change, management and the chief information officer.

Registration for the program is $595. Information is available from Research & Planning Institute, 215 First St., Cambridge, Mass. 02142.

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Packages help London council bridge budgetary limits

LONDON — "If the Greater London Council (GLC) were an independent state, it would be among the top 20 [richest] on the United Nations' list," said the GLC's chief accountant. From airports to zoos, there is virtually no aspect of London life where the GLC does not play a role.

And if the GLC were an independent state, it would certainly have more computer hardware and software per capita than any other in the world: two IBM mainframes, nine CICS systems, 22 minicomputers, 350 micros, the potential for 800 VDTs and a DP staff of nearly 350 people, according to Chief Accountant Eric Hendin.

As the strategic planning authority for Great Britain's capital city, the GLC has major responsibilities for transportation, housing, public health and safety, industry and employment and arts and recreation for this city of eight million people.

With a budget of $2.8 billion and a staff of 22,000, the GLC recently needed help controlling costs. Despite a wealth of DP resources, none of the new financial systems the GLC installed recently were developed internally.

"In September of 1982, on-line financial packages had just come onto the market," Hendin recounted, "and after careful study, we concluded it would be much quicker and less costly to proceed with a package than to develop a new system in-house."

The council evaluated systems from three suppliers and ultimately chose the General Ledger, Budgetary Control, Accounts Payable and Accounts Receivable Systems from Management Science America, Inc. (MSA) of Atlanta, along with MSA's Easy-Plan module and Executive Peachpak, the micro-mainframe link.

"MSA had an on-line order facility to let us check the availability of funds," Hendin said. "MSA systems also give us a choice of methods for accessing stored data, which means cost savings for us."

Flexibility a primary concern

One of GLC's primary concerns was flexibility, Hendin noted. "This is an extremely complex organization. We have to allow for a variety of operational arrangements within a centrally controlled structure. At the same time, we need immediate information about the status of any given account because we are mandated by the government not to overspend. That's a big task, and we simply couldn't do it without a sophisticated system."

GLC differs from a commercial enterprise in several respects, all of which affect accounting functions, Hendin noted. One major difference is that in the fiscal year ending 1986, local authorities in Britain will be "resource controlled," which will limit the amount raised through taxes, making it imperative not to exceed budgets.

"Legally, we cannot overspend," Hendin explained. "But we don't want to risk underspending either, because that would represent lost opportunities for services to taxpayers. This is where the budgetary control system is going to help us — we can control expenditures at an early stage. Much of our spending is seasonal, and with [the budgetary control system], we can get an indication of our commitments immediately." Hendin said the system would handle a load of approximately 150,000 payments each year for the GLC.

> *'Our reporting requirements are much heavier than in a commercial organization. . . . I don't believe anyone is using the ledger report generator as extensively as we are.'*
>
> — Eric Hendin, GLC

Another difference between the government and the private sector is the reporting structures. "Our reporting requirements are much heavier than they would be in a commercial organization," Hendin said. "The emphasis is on control at all levels, departmental to organizational. I don't believe anyone is using the ledger report generator as extensively as we are."

A third difference is the source of income for capital projects. "We borrow from the government and from London money markets," Hendin said. "But since we want to avoid 'shades of old New York' [bankruptcy], we must guarantee the redemption of our loan department. Here again, public accountability really sets us apart from the financial reporting you'll find in a typical business environment."

The council processes at least 650,000 payments per year, and Hendin predicted that one of the key benefits of the new on-line systems will be a reduction in the number of checks produced.

"Now we can make payments directly into the payee's bank account," he said. "We've been working with [Bankers Automated Clearing Services] on this, and we estimate that we could cut the number of checks we produce by 150,000 to 200,000 per year — a substantial savings."

Hendin can recite a laundry list of other benefits accruing from the new systems: quicker processing of urgent payments to contractors and suppliers; a forward due date facility that indicates cash flow and interest benefits up to several months ahead; two-stage validation checks on budget provisions and codes for better financial control; budget forecasting and modeling facilities; simpler value-added tax and contractors' tax calculations; fewer rejected and suspense account items; improved security; flexible allocation methods; unit costing and project costing capabilities; and quicker tracking of items passed for payment.

Once the GLC is in full production on all four of its new financial systems, Hendin plans to expand the use of each system's features. "We want to use the cost allocation module to calculate our administrative costs as we go, for example," he said.

"Another thing we want to do, which is a breakthrough in the use of a package by a local authority, is to automatically produce charges related to borrowing by service departments to fund capital projects. We created a special company — Company L — which is a consolidated loan fund or capital fund. It serves as a banker, making advances and loans to other GLC companies. We'll use the calculation facilities within the General Ledger System to work out the interest charges. It's a very sophisticated use of intracompany accounting. I don't know of any local government that's using a package in just this way."

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Crime awareness seminar scheduled

MINNEAPOLIS — A half-day seminar titled "Becoming Aware/Dealing With Computer Crime" will be held at the Northstar Hotel here on April 18. Geared toward nontechnical managers, the seminar is intended to help them become more aware of the consequences of insufficient control over computers.

The seminar, hosted by Dataline Corp. of Minneapolis and led by Robert Huber, computer crime specialist for the city of Minneapolis, will focus on the value of documentation, the magnitude of computer crime and its effect on business, the vulnerabilities and security/management perspectives of computer systems, safeguarding techniques, computer crime laws and preparation for prosecution.

The seminar will also be held April 22 at the Holiday Inn in Chicago, April 24 at the Atlanta Marriott in Atlanta and April 26 at the Hyatt Orlando in Kissimmee, Fla.

The fee for the half-day seminar is $85.

More information on the seminar is available from Dataline, P. O. Box 15221, Minneapolis, Minn. 55415.

In Your Corner.

"MORE MANUFACTURERS CHOOSE US BECAUSE OF WHAT WE CHOSE: VAX."

Mark W. Ciotek
CEO and President
NCA Corporation

American manufacturers are facing a fiercely competitive and highly aggressive environment that's global in scope.

The key to survival in the face of all this is control. Control over shrinking profitability, increasing costs and reduced planning times. Which means automation through computerization.

But computerizing the manufacturing process is no guarantee of survival. Choosing the wrong approach could be just as costly as not automating at all.

As one person intimately involved with manufacturing, Mark W. Ciotek, explains: "Manufacturing today has to be treated as an integrated process instead of as isolated functions. Successful manufacturers are discovering that with the right approach to computer-integrated manufacturing (CIM), you can produce goods quickly without sacrificing quality."

Mark is CEO and president of NCA Corporation, a leading software developer and marketing company that's helping manufacturers stay competitive with a manufacturing resource planning (MRP II) system called MAXCIM.™

With 20 integrated modules, MAXCIM is designed to handle everything from financial planning in the executive office to job tracking on the factory floor.

"Our comprehensive approach requires a flexible computer system with a wide range of solutions," Mark points out. "That's why we chose Digital's VAX™ computers for MAXCIM. And that's why manufacturers are choosing us."

"VAX GIVES YOU THE WORLD'S MOST FLEXIBLE ARCHITECTURE."

Digital designed the VAX computing environment in a unique way – around one architecture and Digital's VMS™ operating system. "They're the only ones who have done this," Mark states. "As a result, we know we're working with the most flexible system available."

Included within the VAX computing environment is the VAX Information Architecture, a comprehensive system of integrated information management software products. From this vast array of products, NCA's customers can select those best suited for their needs.

Three of these VAX Information Management products – FMS™ forms management system, DATATRIEVE™ query language and report writer, and Common Data Dictionary – are used in conjunction with MAXCIM. By incorporating these products, MAXCIM optimizes the user-interface, and provides easy access and universal definitions for all of your data.

Customers also have the option of adding other Digital software such as DECnet™ networking software. The tremendous communications capabilities between Digital systems allows for unequalled distributed processing power. So you can access and exchange information –

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whether it's stored across the plant or at a plant across the country.

"Digital's approach to software is ideal for MAXCIM because the performance of an MRP II package is enhanced by the degree of integration between modules," Mark says. "And the superior integration within both MAXCIM and the VAX Information Architecture gives manufacturers the most flexible solution possible."

"AS PRODUCTION INCREASES, SO CAN THE POWER OF VAX."

"The economies of manufacturing demand standardization and growth," Mark points out. "With VAX computers, our customers have both."

Every model in the best-selling 32-bit architecture, from the MicroVAX I™ system right up to the largest VAXcluster™ system, is compatible, providing an economical growth path from desktop to data center.

"Because of this compatibility, you can use MAXCIM across the entire line of VAX systems," Mark says. "So when our customers upgrade, they can bring their existing applications right along with them."

This eliminates the need to convert databases, retrain people or totally abandon your investment. And VAXcluster systems provide enough computing resources to meet virtually any requirement.

"VAX computers let us meet the needs of just about any manufacturer," Mark says. "The low-end of the VAX family is ideal for smaller manufacturers, while clustering makes our solutions attractive to much larger companies. Some of our business now comes from existing customers who are upgrading their Digital systems to meet their growing needs."

"DIGITAL IS THE LEADER IN THE MANUFACTURING MARKETPLACE."

"Digital has a solid reputation among manufacturers," Mark states. "After all, they're the leader in distributed processing and are committed to CIM with dedicated resources. And the VMS operating system provides an unparallelled path for growth."

In fact, Digital anticipates and meets manufacturers' needs so successfully that NCA developed MAXCIM to run exclusively on Digital systems.

"We've never felt the need to offer MAXCIM on any other system," Mark says. "They're the experts in systems and we're the experts in MRP II software. Together, we can offer manufacturers the most comprehensive solution.

"Our customers have found that this is the ideal solution for them. With this kind of success," Mark concludes, "we'll never second-guess our choice of VAX computers."

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NEWS

TURNAROUND TIME
Larry Long

***Q** I am a computer professional with 20 years of experience in both teaching and programming. I can program in eight languages. I have been responding to newspaper ads for programmers and teachers for over six months and, in most cases, have not even received an acknowledgment of my inquiry, much less an offer.*

I do not respond to blind ads; I do not consider these either professional or legitimate. My resume is in the hands of several "headhunters," from whom I've heard absolutely nothing. Once, I even reformatted my resume so that 10 years of experience (and hence age) disappeared — no response to that either.

What's going on here? Am I unmarketable? If so, why and what can I do about it? I do not insist on holding out for the salary my experience might demand. I don't apply for a job unless I think I can do the work and accept an offer.

Something is amiss. You might be missing an important ingredient: perhaps a degree, management experience or state-of-the-art knowledge. Or, there may be something about your resume that is turning off potential employers; I routinely come across resumes that are at best arrogant and at worst downright irritating. Yet the writers of these resumes must have felt that they were putting their best foot forward, or they would not have distributed them.

The resume is often the key to the door and should be compiled with great care, with the intended reader in mind. Little things can result in your resume being placed in the circular file. Here are some examples: a 1968 college graduate included his college grade point average; a "super-salesman" writes three paragraphs on his first job and two sentences on his last job; a recent college graduate inserted the company's name in pencil on a pre-printed letter of transmittal; a systems analyst underlines his IBM 1401 Autocoder experience; and the list goes on.

If, in fact, it is your resume that is giving you problems, edit it and pass it on to four or five people who you know will be candid in their assessment. With competition for jobs the way it is, the letter of transmittal and resume must be flawless.

***Q** Last summer, our university took delivery of 300 microcomputers. The departments of sociology, psychology and religion set up a personal computer lab with 25 of them. I chaired a committee that met periodically last semester to decide what to do with them. I'm the only member of the committee with any computer background, and that experience is with mainframes. A search for related educational software turned up nothing that could be used for our courses.*

With pressure from administrators and no real guidance from the committee, I worked with a computer science graduate student to develop some question-and-answer software. We are using it this semester and neither students nor professors have found it useful. To date, the most popular usage of our laboratory is for word processing. Where would I look to find appropriate courseware?

To my knowledge, there is no single-source catalog for educational software. Computer retailers and, perhaps, your college library will have books or buyers' guides listing hundreds of educational packages; however, expect to find a paucity of educational software at the college level in your area. Your best source may be your academic professional journals. If you don't find it advertised or reviewed in these journals, it may not exist.

Good educational software is expensive to produce. Vendors view the educational market as having real potential — but for some time in the future, not now. It is common for vendors to offer business-related software to academic institutions at a 70% to 100% discount and call it promotion. On the other hand, the development cost of educational software falls on the backs of the intended consumers — educational institutions.

The quality and availability of educational software will probably remain relatively stable until it becomes clear that educational institutions are willing to place the same budget emphasis on software that they have on hardware.

Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 880, Framingham, Mass. 01701.

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NEWS

MANAGERS ON THE MOVE

ROBERT L. WHIPPLE has been named director of management information systems for Geo. J. Ball, Inc. in West Chicago, Ill. He will be

Whipple

responsible for administering the information services group and, additionally, will serve in functional and advisory capacities for data processing throughout the corporation.

Whipple's most recent experience has been as director of systems and technical services for ESE, Inc., a subsidiary of Esmark, Inc.

Whipple has a B.S. degree in economics from the University of Illinois at Urbana-Champaign and a M.B.A. degree from American University in Washington, D.C.

Geo. J. Ball, Inc. is a worldwide horticultural breeder and supplier.

■

ROBERT C. TAYLOR has been appointed assistant vice-president and manager of technical research and office systems at Liberty Mutu-

Taylor

al Insurance Co.'s data processing center in Portsmouth, N.H.

Taylor previously served as manager of research and information services in Portsmouth.

He graduated from Boston University in 1970 and holds a bachelor's degree in mathematics.

The technical research and office systems unit performs long-range research on computer products. The technical research unit is responsible for recommending corporate hardware and software standards.

The unit also monitors technological advances and seeks their practical applications to Liberty Mutual's operations.

■

ROBERT A. WHISTEN has recently joined Leasametric, Inc. as vice-president of management information systems. In this position Whisten will be responsible for overseeing all computer activities within Leasametric,

Whisten

including its extensive international terminal network that spans the U.S., Canada, West Germany, France and Israel.

Prior to joining Leasametric, Whisten had served as director of information resources for Koret of North America, Inc. He was responsible for managing the computer operations department, the technical support group and a systems development department.

Whisten also worked at Crowley Maritime Corp. as a project leader and at Kaiser Industries as manager of employee benefits systems. Leasametric, a member of the Marmon Group, rents, leases and sells test instruments, personal computers, computer terminals and peripherals, microprocessor test and development systems and telecommunications test equipment.

Whisten attended Merritt College and Armstrong Business College.

Alonzo Chappel, *Battle of Bunker Hill*. Courtesy The Bettmann Archive.

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Token/Net operates over low-cost CATV cable with enough bandwidth to link literally thousands of data, voice, or video devices over distances to 25 miles. Token/Net's multi-port TIMs (Token/Net Interface Modules) implement the IEEE-802.4 token passing access method, giving all users network access free from data collisions. Sophisticated software, diagnostics and full-featured management options give network managers complete control over network activity. If you're up in arms over networking systems that fall short of your requirements, call us at (617) 890-1394 or write 303 Bear Hill Road, Waltham, MA 02154, telex 951793.

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NEWS

CALL FOR PAPERS

THE FIFTH INTERNATIONAL ROCHESTER FORTH CONFERENCE
Rochester, N.Y., June 12-15

Papers are now being sought for this conference sponsored by the Institute for Applied Forth Research, Inc. Potential topics include: software engineering and software management practices; Forth applications; Forth technology, including finite-state machines and metacompilers; and Forth implementations.

Papers may be presented in either platform or poster sessions. Abstracts of 200 words must be submitted by March 30, 1985. Papers must be received by April 30, 1985 and are limited to a maximum of four, single-spaced, camera-ready pages.

Abstracts and papers should be mailed to Conference Chairman Lawrence P. Forsley, Laboratory for Laser Energetics, 250 E. River Road, Rochester, N.Y. 14623. For more information, write to Maria Gress, Institute for Applied Forth Research, 70 Elmwood Ave., Rochester, N.Y. 14611.

CMG '85 INTERNATIONAL CONFERENCE
Dallas, Dec. 10-13

This international conference will focus on the management and performance evaluation of computer systems. Papers, tutorials and new books are encouraged in areas such as establishing a capacity management program; justification, planning and control of personal computers; capacity planning and prediction; work load characterization/forecasting; distributed processing analysis; I/O subsystem performance analysis; user requirements and service agreements; AT&T's Unix; AI and expert systems; establishing goals and measuring productivity; DP budgeting, cost accounting, charge-back and financial management; hiring and managing a customer premises equipment (CPE) staff; professionalism in CPE; software performance; problem management and change control; management's relationship to corporate staff; and network design and optimization.

Preference will be given to papers and books that have not been previously presented. Authors of papers will be required to assign copyright for their papers to CMG for publication in the proceedings. Eight copies of abstracts are due by April 1, 1985, and should be sent to Program Chairman, CMG '85, Suite 302, 101 S. Whiting St., Alexandria, Va. 22304.

INTERNATIONAL CONFERENCE ON SYSTEMS, MAN AND CYBERNETICS 1985
Tucson, Ariz., Nov. 12-15

Papers are now being accepted for this conference covering the following topics: human-machine interaction, large-scale systems, behavioral decision making, manufacturing systems, pattern recognition, human-computer interaction, expert systems, robotics, biomedical engineering and other related topics at the forefront of technology.

Three copies of a one-page abstract should be submitted by April 15 or completed papers by June 15 to A. Terry Bahill, Technical Program Chairman, Systems and Industrial Engineering Department, University of Arizona, Tucson, Ariz. 85721.

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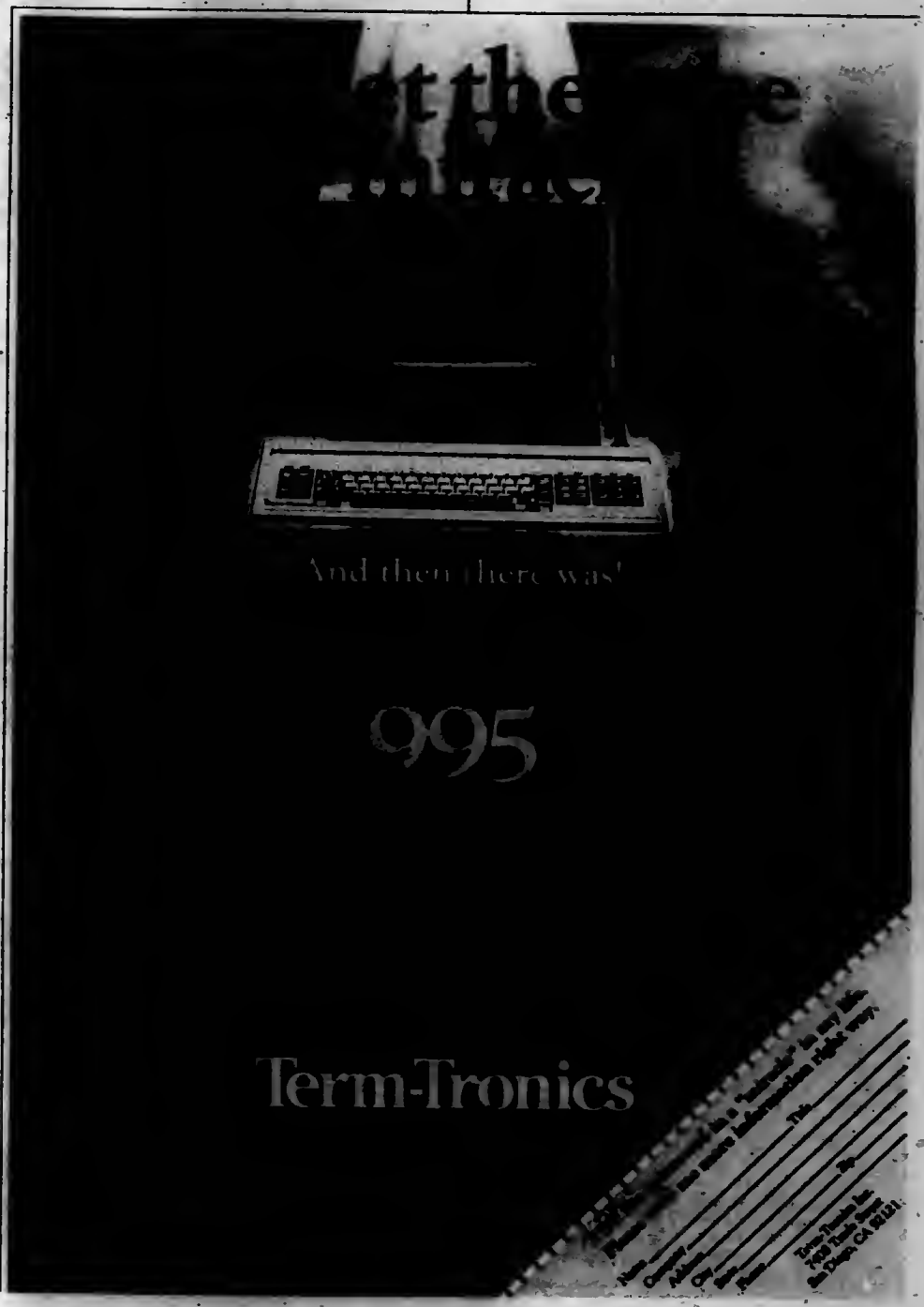

CALENDAR

WEEK OF APRIL 21

APRIL 21-24, NASHVILLE — **The 1985 Annual Conference of the Association for Systems Management.** Contact: the Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

APRIL 22-23, WASHINGTON, D.C. — **How to Manage Data and Information as Resources.** Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

APRIL 22-23, BALTIMORE — **Structuring & Negotiating Hardware Contracts, Software Contracts, and DP Service Contracts.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held April 29-30 in Chicago.

APRIL 22-23, CHICAGO — **Data Communications and Networking for the IBM Personal Computer and Other Personal Computers.** Contact: Dorothy Daly Marshall, Digital Consulting Associates, Inc., 6 Windsor St., Andover, Mass. 01810.

APRIL 22-24, WASHINGTON, D.C. — **Protocols for Message Handling Systems.** Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

APRIL 22-24, LOS ANGELES — **Data Base: A Manager's Guide.** Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402. Also being held June 3-5 in Toronto.

APRIL 22-24, NEW YORK — **Speech Tech '85 Voice Input/Output Applications Show.** Contact: Media Dimensions, Inc., P.O. Box 1121, Gracie Station, New York, N.Y. 10028.

APRIL 22-25, CHICAGO — **CICS Applications Design.** Contact: Syscd, Inc., 35 W. 35th St., New York, N.Y. 10001.

APRIL 22-25, WASHINGTON, D.C. — **National Conference on Decision Support Systems.** Contact: Conference Manager, U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, Md. 20903.

APRIL 22-25, SAN FRANCISCO — **The International Conference on Information Management.** Contact: The Institute for Information Management, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

APRIL 22-26, WASHINGTON, D.C. — **Design of Computer Operating Systems: Concepts and Principles.** Contact: George Washington University, Continuing Engineering Education, Washington, D.C. 20052.

APRIL 22-26, NEW YORK — **Data Base Development Workshop.** Contact: Elise Rabalais, Learmonth & Burchett Management Systems, Inc., Suite 405, 2800 N. Loop W., Houston, Texas 77092.

APRIL 22-26, NEW YORK — **MVS JCL.** Contact: Syscd, Inc., 35 W. 35th St., New York, N.Y. 10001. Also being held April 29-May 3 in Chicago.

APRIL 23, BOSTON — **Seminar on Data Communications.** Contact: Bill Hopkins, Simware, Inc., 14 Concourse Gate, Nepean, Ontario, Canada K2E 7S6. Also being held April 24 in New York and April 25 in Washington, D.C.

APRIL 23-25, NEW YORK — **Teleprocessing Fundamentals.** Contact: Amdahl Corp., National Education Center, M/S 302, P.O. Box 3470, 1250 E. Arques Ave., Sunnyvale, Calif. 94088.

APRIL 23-25, LOS ANGELES — **Effective Management Techniques for Data Processing Managers and Project Leaders.** Contact: Abbott, Galvani Associates, 1850 Union St., San Francisco, Calif. 94123.

APRIL 24-26, ANAHEIM, CALIF. — **The IBM Personal Computer.** Contact: Data-Tech Institute, P.O. Box 2429, Lakeview Plaza, Clifton, N.J. 07015.

APRIL 24-26, BOSTON — **Data Communications Systems & Networks.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

APRIL 24-26, BOSTON — **Local-Area Networks.** Contact: Data-Tech Institute, P.O. Box 2429, Lakeview Plaza, Clifton, N.J. 07015. Also being held April 29-May 1 in San Francisco.

APRIL 24-26, WASHINGTON, D.C. — **MVS Internals.** Contact: Acts Corp., 11910 Gate Way, Austin, Texas

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APRIL 24-26, WASHINGTON, D.C. — How to Build and Use a Data and Information Resource Directory. Contact: Barnett Data Systems, 19 Orchard Way N., Rockville, Md. 20854.

APRIL 24-26, SAN FRANCISCO — Unix Systems Expo '85 — Spring. Contact: David Small, Computer Faire, Inc., 181 Wells Ave., Newton, Mass. 02159.

APRIL 24-26, WHITE PLAINS, N.Y. — Unix. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held May 1-3 in Rochester, N.Y.

APRIL 24-26, WASHINGTON, D.C. — Computer Graphics for Business. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

APRIL 25-26, WASHINGTON, D.C. — Dbase III: Its Techniques and Its Applications. Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

APRIL 27-28, NEW YORK — CICS Command-Level Intensive. Contact: Syscd, Inc., 35 W. 35th St., New York, N.Y. 10001. Also being held May 4-5 in New York.

APRIL 27-MAY 1, LOUISVILLE, KY. — Common's Spring '85 Conference. Contact: Common, Suite 1717, 435 N. Michigan Ave., Chicago, Ill. 60611.

WEEK OF APRIL 28

APRIL 28-MAY 1, MARCO ISLAND, FLA. — Fifth Annual Conference and Symposium on Security and Disaster Recovery Planning. Contact: Nancy DeMatteo, HSH, Inc., 6600 N. High St., Worthington, Ohio 43085.

APRIL 29-30, DES MOINES, IOWA — Managing Information Centers Effectively. Contact: Thomas Bisacquino, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

APRIL 29-30, LOS ANGELES — Software Configuration Management. Contact: Data Processing Management Association Educational Foundation Seminars, c/o Technical Training Corp., Department SCM, P.O. Box 3606, Torrance, Calif. 90510.

APRIL 29-30, NEW YORK — Information Centers. Contact: Software Institute of America, 8 Windsor St., Andover, Mass. 01810.

APRIL 29-30, SAN FRANCISCO — CAD/CAM Data Bases: Who's In Control? Contact: Jacqueline Cooper, CAD/CAM Alert, 824 Boylston St., Chestnut Hill, Mass. 02167.

APRIL 29-MAY 1, DALLAS — MVS Architecture. Contact: Acts Corp., 11910 Gate Way, Austin, Texas 78727. Also being held May 13-15 in Memphis and May 29-31 in New Orleans.

APRIL 29-MAY 1, CHICAGO — Establishing a Computer Security Program. Contact: Computer Security Institute, 43 Boston Post Road, Northboro, Mass. 01532.

APRIL 29-MAY 2, WASHINGTON, D.C. — Experts on Networks. Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

APRIL 29-MAY 3, SEATTLE — Ada Software Engineering Workshop. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402. Also being held May 6-10 in Boston.

APRIL 29-MAY 3, NEW YORK — CICS Internal Architecture. Contact: Syscd, Inc., 35 W. 35th St., New York, N.Y. 10001.

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MAY 1-3, ANAHEIM, CALIF. — Local-Area Networks: An Evaluation of Technology, Applications & Designs. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held May 8-10 in Cincinnati.

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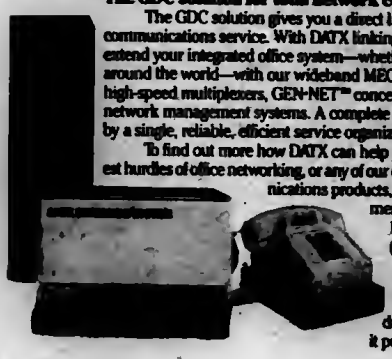

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EDITORIAL

Blacklist

Integrity: rigid adherence to a code of behavior or ethics.

We've been scratching our heads lately trying to figure out why an increasing number of computer-related publications have decided to treat integrity as they would an impertinent dinner guest: they are ignoring it.

We are particularly puzzled — not to mention downright irked — by the growing tendency of some trade publications to ignore blatantly what is known as a "news embargo." Essentially, an embargo comes about when a vendor, for several reasons, previews a major product announcement for the press and requests that those who see the preview forego printing the information until a definite time in the future.

Like an off-the-record comment, it is clear to any experienced journalist that an embargo carries with it explicit dos and don'ts. It is a simple matter of business ethics. Why, we ask, are these universal ethics so difficult for people to follow?

Examples are in order. In late January, Apple Computer, Inc. announced its Macintosh Office. The company previewed the announcements the week prior to the public unveiling and did so for a select group of business, trade and daily newspaper reporters. Apple also made it clear at that preview that no information of the announcements was to be printed until after the company's annual meeting the following week.

That is why *Computerworld* and other publications groaned the Monday before the annual meeting when a competing publication proudly and singularly played the story on its front page. That, Apple conceded, was blatant disregard of the embargo. This disregard, of course, was transparent to readers, who assumed the publication simply scooped the competition.

Some vendors have gone so far as to ask reporters to sign nondisclosure statements when previewing products. This, however, did not stop another publication from publishing an entire announcement one week in advance of the embargo date, as well as handing out copies of the article at a communications conference two weeks before the embargo date.

The list of flagrant violations of journalistic ethics goes on — and, unfortunately, the list is getting longer. The good news is that some vendors now realize how harmful this can be to general press relations and to their own self-interest. The vendors' reactions typically are taking the form of a new kind of embargo, namely, eliminating certain publications from the list allowed to see preview material. In other words, these publications are being blacklisted.

Computerworld will continue its long-standing policy of strict adherence to stated embargoes and hopes the vendors will continue to police embargoes using whatever means are appropriate.

Perhaps this will explain to our readers why, at times, we are the victim of our own integrity.

LETTER

DP salary gap citing called invalid

I found the article "Salary gap pervades DP" [CW, Feb. 11] reasonably well-balanced in dealing with DP salaries. From my experience in Fortune 500 companies, entry-level salaries are indeed based upon ability and not on an individual's sex.

The material and the manner in which it was handled tips the overall balance of the article to a feminist view. As such, it is appropriate as an editorial, but certainly not as a news item. It was already acknowledged that new hires draw within 3% of each other ($24,828 vs. $24,060). The article said employers desire longer hours than they advertised for, which the article said men are more willing to provide. Then a statistically invalid survey was quoted as finding an average male salary at $32,085 and the average female salary at $22,050, when education and job satisfaction levels were said to have "no significant differences."

Any survey on male/female DP salary that does not take into account years of experience is invalid. The average female in DP has been in the field a much shorter time than the average male. Ten years ago women could be found in the profession but certainly not in the numbers found today.

One striking difference between men and women in this profession is their ability to accept their own limitations. When a man realizes he is not capable of performing the work required of him, he will acknowledge this and seek another line of work; a woman in the same situation has been conditioned by our society to immediately conclude that she has been discriminated against.

David A. Crowell
Bartlesville, Okla.

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VIEWPOINT

Technical support staffs deserve a fair shake

THE DATA CENTER
John P. Murray

One absolutely critical MIS area whose contribution does not always receive its fair share of credit is the technical support group. Those of us blessed with competent, hard-working technical support people too often tend to overlook their contributions.

Of course, such is not the case in installations where the competence level is less than desirable. Because of the critical nature of the technical support function, a less-than-competent performance from the group quickly generates both bad press and real difficulty for the entire MIS function. When that situation occurs, it is impossible to take technical support for granted, because technical support problems quickly become the concern for all of MIS.

Because of the technical support group's critical nature and because of the various pressures it faces, considering some of the continuous concerns that are part of the technical support group's job might be worthwhile. If we can empathize more with the technical support group's problems, perhaps we can develop a better appreciation for the work these people do.

First, because of the nature of the work, the role of technical support tends to be thankless. When the work is well done, when the operating system and all the ancillary software is functioning correctly, no one notices the hard work being done to make it all happen.

In fact, to some degree, doing a really good job in the technical support area tends to work against the section. When a serious operational software problem does arise in a well-run installation, there is often greater than warranted excitement generated in the rest of MIS and often in the entire organization because the event is unusual. We become accustomed to a certain level of performance. Over time, any slippage from that level tends to assume unrealistic proportions.

It is easier to appreciate the pressure the technical support group faces when you consider the fact that its mission is not only complex, but also structured so that even rather minor errors or problems beyond the group's direct control (the failure of one vendor's software products, for example) can earn the group instant and very high-level visibility. This is particularly true in an interactive processing environment, where loss of the system easily equates to loss of much of the production throughout the organization.

> *When a serious operational software problem does arise, there is often greater than warranted excitement generated in the rest of MIS and the organization because the event is unusual.*

In even a moderately sophisticated information processing environment, a very tangled web of software may be installed to provide the required services. In addition to the standard operating software, teleprocessing software and job accounting and data base system packages, any number of ancillary software components may be installed to improve, modify or monitor the operating environment. All this software must be tailored to operate together not only reliably, but also in a manner that assures rapid recovery if a failure arises. This is a formidable task!

This situation presents a clear vulnerability problem for the technical support staff. New versions of the existing software component or a "fix" to the existing version must be installed to bring the package up to the required operating level to assure continued vendor support or to improve the operating environment. Anything can go wrong when these changes are effected. If something does go wrong, the consequences range (always with the chance of embarrassment for technical support) from minor difficulty to loss of the entire system, perhaps for a substantial period. And in a sophisticated information processing environment, several minutes may be considered substantial.

So the pressure to keep the system operational is always present. In addition, because of the heavy use of the system, opportunities for the technical support group to make system changes do not occur very often. Considerable work must be carried on during the third shift and on weekends — not a particularly pleasant prospect for those who have to get the job done. That pressure can also increase the tension between technical support and the rest of the MIS organization.

IBM system users will get some help

There is help for those with IBM systems. The installation of the IBM VM software product will, among other things, provide a facility for building a test environment where much of the preliminary software changes and testing can be carried on during prime shift time. VM can help decrease the work time the technical support people must spend on the third shift and on weekends. Some installations are concerned that VM uses too many resources. This is not true if it is correctly installed and managed. And the benefits derived will more than compensate for the additional resource cost.

Although the technical support group faces a unique and difficult array of concerns for which those outside the section should show a bit more understanding and patience, it can improve its image. The technical support section should be more attentive to "selling" itself to the rest of MIS. Those in technical support may say this is not the case — that their jobs are to keep things running.

See SUPPORT page 40

Murray is director of management information services for Rayovac Corp., Madison, Wis., and author of Management Information Systems as a Corporate Resource, *published by Dow Jones-Irwin.*

Drive to certify quality assurance accelerates

QUALITY
Wayne Smith

At the 1984 Data Processing Management Association (DPMA) Quality Assurance Symposium in Chicago, a survey of attendees showed that more than 80% wanted certification programs for quality assurance analysts. This topic was also discussed heavily during the board of advisors meeting of the Quality Assurance Institute (QAI), which meets annually during the DPMA symposium. (I am a member of that board.) The QAI, under executive director William Perry, has taken a significant leadership role during the last 1½ years, attempting to act as a catalyst for such a certification program. The increasing recognition and acceptance of software quality assurance programs, together with the strong membership support the survey reflects, makes this an important topic for the entire data processing industry.

Although this program is clearly only in its formative stages, there is a growing sense that it should be established. At this point, six local QAI chapters have accepted the assignment to assist in further defining the nature of the program. It is their responsibility to define the skills and knowledge that would form the basis for certification. The final program is scheduled to be presented to the QAI board during the April DPMA Quality Assurance Symposium, with the goal of being launched later this year.

Continuing education required

As it is currently envisaged, the certification program is intended to certify qualifications and will require certified applicants to maintain their skills through continuing education programs. It is intended that the initial process will not require applicants to take a test, but rather require that their skills and experience be deemed acceptable to their peers. Compliance with a code of ethics and a statement of responsibilities will be required, and it is anticipated that the finalized certification process will be administered by an independent agency specializing in such programs.

The need for such a program stems from the growing importance of quality DP systems. Up to now, organizations that have established independent quality assurance functions have faced two somewhat troublesome and recurring problems: substantiating the credibility of the individual analyst (the "quality" of the quality assurance analyst) and identifying the qualifications for the role in hiring, placement and performance appraisal.

The certification program attempts to professionalize the role of the quality assurance analyst and, as a consequence, improve the role's ability to assist MIS at all levels. In particular, it is hoped that the certification process will assist MIS to ensure that those placed in roles as quality assurance analysts will meet an industry-defined level of performance and thus address both credibility and qualification issues.

Diversity may create problems

The question of quality assurance analyst certification was discussed by Nancy Kastl, a manager with Harris Bankcorp, Inc. and coordinator of the Chicago Quality Assurance Association, at one of the group's local chapter meetings. Kastl said the members questioned the feasibility of such a program because of the current high degree of diversity among the practitioners about the exact role of quality assurance. The group indicated that almost 30 different activities fall under the overall quality assurance umbrella. Moreover, high on the group's list were the human factors and interpersonal skills that are highly subjective and thus somewhat more resistant to precise specification. Kastl said a stronger stabilization of the quality assurance function was needed before a suitable certification program could be successfully launched.

Peter Wilson, manager of the internal quality assurance group of my organization who is also involved

See QUALITY page 40

Smith is vice-president, specializing in quality, at Applied Information Development, Inc. in Oak Brook, Ill.

LETTERS

Clarifying relational DBMS

The In Depth article, "Relational DBMS" [CW, March 4] offered innovative and valuable ideas on designing data base management system products for high performance. It also has prompted me to issue the following (I hope pragmatic) warnings on the subject:

■ Co-location storage techniques and combined indexes can clearly boost performance. But will they also impede one of the heralded advantages of relational systems — their suitability for physically distributed data bases?

■ The tendency is unavoidable, but beware of treating "relational DBMS" as a generic class and of assuming that any given characteristics or technique is the exclusive property of one or the other.

■ Distinguish between the relational DBMS model itself and products that attempt to implement it. Have you noticed that attacks upon relational DBMS tend to focus on the inadequacies of commercial products, whereas the defenses (and this article was a refreshing exception) choose to discuss the model itself? Both sides may be correct. Do not fall for the relational DBMS label; judge each product on its own merits or demerits.

■ At the risk of being facetiously grouped with defenders of the Roman numeral system, I have to qualify the article's central point: Once relational DBMS perform, "then no single reason remains for implementing any other kind of DBMS." Most relational products (not models, but products) have a fatal flaw entirely apart from their current performance characteristics — they fail to support defined data relationships and referential integrity.

This flaw relegates them to the status of file managers, as opposed to true DBMS. Many are essentially two-dimensional products trying to model a three-dimensional (or better yet, four-dimensional) world.

Relational DBMS may indeed be the next "golden apple," but in our enthusiasm, let's not treat it as the last word in fruit.

Bob Morison
Burlington, Mass.

Salary adjustments needed

In the article "Some will go hungry" [CW, Dec. 31/Jan. 7] on DP salaries, a manager was cited who said that after his systems analyst gained experience, the employee was worth $8,000 more than the manager was paying him. The manager went on to say that, once experienced, the systems analyst left and that the manager had to hire someone new and retrain him.

It is clear that the manager understands the problem: He does not pay his experienced systems analyst market value for his DP skills, so the systems analyst leaves. I am amazed that the manager — having understood his personnel problem so well — did nothing to solve it but went on in the cycle of hire, train, lose, hire, train, lose. The solution has to lie in the company's job and salary structure.

George E. Sauer
Rockville, Md.

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QUALITY from page 39

with several client organizations in establishing quality assurance programs, raised a different issue. He said he believes that perhaps the current constructive efforts surrounding certification could be reoriented slightly so that the objective would be to certify a company's entire quality assurance program. This would not only include the basic matrix of duties and responsibilities actually required to carry out the various quality assurance roles but would also define their relationships, organizational placement and management reporting requirements. This top-down approach would give an organization the generic architecture of a quality assurance program to use as a road map, helping the organization to improve the quality of its information services products. This architecture also would more clearly define the various roles in the quality assurance program. Some roles would necessarily be a part of the quality assurance function; others might not. For example, configuration management, independent testing and system design assurance are all important roles in an effective quality assurance program and could benefit from a level of certification, but not all are necessarily part of an actual quality assurance function.

SUPPORT from page 39

not conduct public relations campaigns. But being a bit more open, putting additional effort in letting those affected know ahead of time what may happen if the system goes down and building MIS confidence through plans to be put into place if things do go wrong all go a long way toward building confidence in the technical support group's ability as well as lessening tension between technical support and the rest of MIS.

Technical support provides a necessary function, often under adverse circumstances. Those who are not involved in the day-to-day issues that these people must deal with should be a little more appreciative of their work and more aware that without the contribution of a competent technical support section we are all in serious trouble.

SOFTWARE & SERVICES

SOFTLINE
Gary Gulden

Analyze needs for exec systems

A recent survey by the MIT Center for Information Systems Research suggested that more than half of Fortune 500 corporations are developing an executive information system of one form or another.

An executive information system typically is a terminal- or microcomputer-based workstation designed to provide access to personal, corporate and external data bases. Intended to support the key aspects of a senior executive's work, it offers a menu of easy-to-use applications tailored to the executive's needs.

Glowing accounts of successful executive information systems abound in the business press, but most efforts yield disappointing results. Below are three case histories that may suggest why.

To begin, let's dispense with the obvious reasons why information systems projects fail: poor top management support, shoestring budgets and inept information systems staffs. The following three corporations have none of these problems.

- They are strong industry performers with first-rate management teams.
- They had sound, capably staffed and well-supported organizations responsible for implementing and supporting the executive information system.
- Their efforts to develop an executive information system enjoyed informed support from senior management.
- They provided executives with relatively easy to learn and use workstation environments.
- They were not afraid to spend a reasonable amount of both time and money in the

See SOFTLINE page 52

Gulden is vice-president of Index Systems, Inc. in Cambridge, Mass.

SOFTALK/JOHN GALLANT

Distributed tools on horizon?

It's amazing how a little software can make a big computer behave. Consider microcomputer software. Only a few years ago, when all that was available to pioneering micro users was a handful of games and some esoteric techie-oriented programs, the mainframe acted like the lion in *The Wizard of Oz* — it was the king of the corporate information processing forest.

When some micro packages with useful business applications hit the market, such as Lotus Development Corp.'s omnipresent 1-2-3, the microcomputer took off in the corporate world. The mainframe, on the other hand, seemed to take on the role of the settlers in one of these tired westerns that fills the television screen on a lazy Saturday afternoon. The mainframe, and the minions who maintained it, went into a reactionary "bring the wagons into a circle" mode to defend against the onslaught of the micro hordes.

Today, microcomputer software is again changing the role of the mainframe. With the advent of micro-mainframe communications software and with the promise of integrated micro-mainframe applications — with shared processing responsibilities — the mainframe is becoming something of a Father Flanagan to the micro kids of the Information Processing Boys Town.

The mainframe is beginning to share its wealth of information and its num-

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Mapics II out for System/38

WHITE PLAINS, N.Y. — IBM has announced that its Manufacturing Accounting and Production Information Control System Version II (Mapics II) now runs on the IBM System/38 minicomputer. The company also announced enhancements to its Mapics II software for the System/36 mini.

According to an IBM spokesman, Mapics II for the System/38 provides manufacturers with integrated, modular applications. The product consists of 13 application modules, including production control and costing, payroll, accounts payable and receivable, inventory management, product data management, order entry and invoice, material requirements planning (MRP) and cross-application system support. Files can be migrated from existing System/38 Mapics systems to Mapics II.

See IBM page 44

Programming facility offered for SAS package

CARY, N.C. — SAS Institute, Inc. has announced an interactive programming facility and an applications development tool for its SAS System statistical software.

An SAS Institute spokesman said SAS/IML is an interactive programming facility for data analysis and manipulation. The software is said to be interactive at the statement level, with each statement executing immediately. It is designed to save programming time because data management, mathematical and matrix operations are built into the software.

The spokesman said SAS/IML is a tool for handling data and programming mathematical applications. It offers a high-level programming approach similar to the APL language, data manage-

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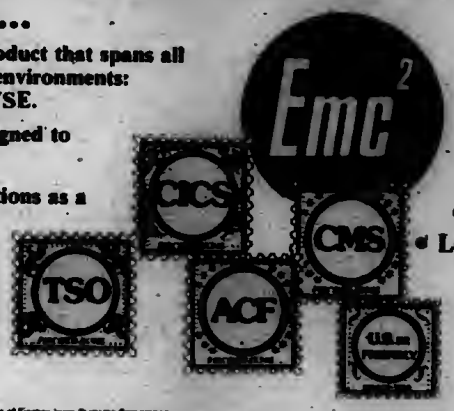

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SOFTWARE & SERVICES

SYSTEMS SOFTWARE

■ **Raxco, Inc. has announced that its accounting and system billing software now runs on Digital Equipment Corp. VAX processors under DEC's VMS Version 4.6.**

Rabbit-1 Version 4.0 facilitates system usage accounting that allows computer resources to be charged differently for a variety of environments, a spokesman said. The software includes capabilities for electronic mail billing, select image surcharging, job queue accounting and a shift monitor.

Rabbit-1 is priced at $995 for DEC VAX-11/730 and VAX-11/725 systems.

Raxco, 1370 Piccard Drive, Rockville, Md. 20850.

■ **Decision Point, Inc. has announced PRO-2, an IBM CICS applications generator.**

A spokesman said PRO-2 is a Cobol map and program builder. PRO-2 allows a user to name the map to be developed and then paint the desired format on a blank screen. PRO-2 then converts the developed map into IBM Basic Mapping Support macros, which are assembled and stored in the source program library. The product converts program definitions into structured CICS Cobol command-level code for storage in the program library.

To build a program, a user names the program, the files and fields it will use and where it will be stored. PRO-2 takes the definition and converts it to CICS Cobol command-level code.

PRO-2 costs $17,500 for the DOS environment and $24,500 for OS.

Decision Point, Suite 260, 2995 N. Cole Road, Boise, Idaho 83704.

■ **Diversified Software Systems, Inc. has announced a job control language (JCL) utility for IBM's OS/VS and MVS operating systems.**

Job/Scan reads one or more JCL statements, automatically accesses any called procedures and performs more than 150 syntax and logic checks, a spokesman said. A user Exit facility can be written in Cobol, PL/I or assembler language. The product can be executed online by any editor or as a batch program.

Job/Scan is licensed for $12,500.

Diversified Software Systems, Suite 205, 906 Minnesota Ave., San Jose, Calif. 95125.

■ **Axios Products, Inc. has announced Spitab table management software for users of IBM's DOS or MVS operating systems with CICS and IMS.**

According to a spokesman, Spitab provides capabilities for building and managing tables. Spitab acts as an interface module to allow applications programs to retrieve data from tables and provides security features.

Spitab costs between $10,700 and $17,000, depending on the operating environment.

Axios Products, 2364 Middle Country Road, Centereach, N.Y. 11720.

■ **Delft Consulting Corp. has announced the BCC checkout compiler for the C language. It is available on Digital Equipment Corp.'s VAX series running AT&T's Unix System V or the University of California at Berkeley's 4.2BSD Unix, AT&T's 3B series under Unix System V and on the Coutel Codata 3300 micro.**

The BCC compiler aids in the debugging and reliability testing of C programs. The product reportedly inserts error-checking code into a program during compilation and displays a message if an error is found.

Prices for the BCC compiler range from $950 to $9,950, depending on host system.

Delft Consulting, 432 Park Ave. S., New York, N.Y. 10016.

■ **A security system and capabilities for document report distribution are among the enhancements con-**

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SOFTWARE & SERVICES

tained in Version 4 of Help/38 Systems, Inc.'s Robot38 system software for the IBM System/38 minicomputer.

Robot38 allows users to execute programs and commands with no operator intervention, permitting 24-hour operation of computer systems, a spokesman said. Program recovery enhancements enable Robot38 to call on an alternative program in the case of program failure.

Robot38 Version 4 is priced at $1,595.

Help/38 Systems, 15102 Minnetonka Industrial Road, Minnetonka, Minn. 55345.

■ Signal Technology, Inc. has announced Version 4.0 of its Smartstar series of development and information management software for users of Digital Equipment Corp. VAX computers.

Version 4.0 offers a general report writer and Opal, an interface that allows for relational program query and reporting to both DEC's RMS and RDB relational data base management systems. Smartstar features a user interface to DEC's RDB and a Relational Query Processor interface to VAX RMS files.

Pricing for Version 4.0 of Smartstar ranges from $3,500 to $25,000, depending on host system.

Signal Technology, 5951 Encina Road, Goleta, Calif. 93117.

■ Mednick Enterprises has announced a tape management system for Tandem Computers, Inc. computers.

Tapes/MGR catalogs magnetic tapes as they are used and tracks what is on each tape, where it is located and when it should be scratched and cleaned, a spokesman said.

The product consists of a maintenance program that allows the user to define data sets and produce reports; a tapes request program that notifies operators that a tape should be mounted or dismounted; a tapes scratch program that scratches expired tapes; and a tapes operator utility program used for handling missing tapes.

Tapes/MGR is priced at $3,500.

Mednick Enterprises, 1680 Arbor Drive, San Jose, Calif. 95125.

APPLICATION PACKAGES

■ Manufacturing Management Systems has introduced a closed-loop manufacturing system for IBM's DOS and OS/MVS operating systems.

Reportedly, the Manufacturing Resource Simulation (MRS) system consists of three integrated modules: master production scheduling, material requirements planning and capacity management. MRS includes sales order tracking functions and a simulation process that combines backward and forward planning capabilities.

The master production scheduling module includes capabilities for job-chaining, multilevel planning and computer-generated billing.

MRS is priced at $126,000.

Manufacturing Management Systems, P.O. Box 14484, Houston, Texas 77221.

■ J. D. Edwards & Co. has introduced an enhanced version of its financial applications software for IBM System/38 minicomputers.

The World Systems financial software reportedly includes general ledger, accounts payable and receivable and address record-processing modules.

Enhancements include a redesigned data base that allows users to maintain monthly information and support up to 14 accounting periods each year and a question mark function that allows users to call up on-line documentation. Functions supporting partial payments and a report generator for creating custom reports have also been added.

The set of four World Systems modules costs $41,000.

J. D. Edwards, 4949 S. Syracuse St., Denver, Colo. 80237.

See TOOLS page 44

The exceptional flexibility of the ESP 6310 terminal sets it sharply apart from the crowd.

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PEACE OF MIND TECHNOLOGY

Graphwriter

THE ART OF PERSUASION

SOFTWARE & SERVICES

TOOLS from page 43

■ Uccel Corp. has announced Release 2.3 of its Paperless Item Processing Manager interface for electronic funds transfer between financial institutions and automatic clearinghouses.

The Paperless Item Processing Manager includes automatic proof control and transaction warehousing that bases distribution on destination requirements.

The product runs under IBM's DOS and OS operating systems. It can be installed as a stand-alone product or licensed as part of Uccel's Infopoint financial information network. It costs $45,000 for DOS systems and $52,000 for OS systems.

Uccel, Uccel Tower, Exchange Park, Dallas, Texas 75235.

■ McDonnell Douglas Computer Systems Co. has introduced a job shop management package for its Microdata line of minicomputers.

The Job Shop Management and Control System (JMC) consists of seven integrated modules: job estimating, quoting, routing, inventory control, bill-of-materials, purchase order processing, work order launching, shop floor control and standard financials, a spokesman said. Modules are priced from $8,000 to $20,000.

McDonnell Douglas also announced the Manufacturing Management and Control System (MMC) for Microdata minicomputers. MMC modules include: engineering, sales order processing, master production scheduling, work-in-process costing, shop floor control, standard costing, inventory planning, purchasing, work order launching, accounts receivable, accounts payable, payroll and general ledger.

MMC is priced from $2,500 to $37,500, the vendor said.

McDonnell Douglas Computer Systems, 17481 Red Hill Ave., Irvine, Calif. 92714.

■ Alpine Datasystems, Inc. has announced version 4.2 of its Project Time Management software for Digital Equipment Corp. computers running DEC's RT-11, RSTS and VMS operating systems.

Project Time Management Version 4.2 includes a budget overrun report, a selective accounts receivable aging analysis that shows outstanding balances for periods defined by the operator and a deferred billings report that lists items intentionally postponed from current billing, a spokesman said.

Project Time Management Version 4.2 costs from $7,000 to $20,000.

Alpine Data Systems, Suite 1950, 111 S.W. Fifth Ave., Portland, Ore. 97204.

■ Control Data Corp. has introduced the menu-driven Cyber-Exploration and Production Interpretation Capability (Epic) system, an integrated set of applications and interpretation tools for oil and gas exploration, analysis and production processes.

Cyber-Epic operates on CDC's Cyber 180 computer series under CDC's NOS operating system. The system also operates on industry

Continued on page 46

To date, there are 20,000 COMET International systems installed around the world, serving over 100,000 individual workstations.

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COMET was designed to meet local managements' and headquarters' requirements at the same time.

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Each individual COMET system is tailor-made from an extremely large variety of products matched to the needs of the departments where they will be used. These products are put together into one system which works.

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All of this works to make our customers more competitive wherever they compete.

If our record is golden, it's because theirs is.

Nixdorf Computer Corporation, 300 Third Avenue, Waltham, MA 02154.

NIXDORF COMPUTER

IBM from page 41

Programs are written in System/38 RPG-III programming language and were designed to execute under System/38's CPF. The IBM System/38 CPU must be used with the system. A security system restricts access within the applications.

Mapics II for the System/38 will be available in the fourth quarter, and module prices will range from $2,420 to $8,860.

Several enhancements were added to IBM's Mapics II for the System/36. According to an IBM spokesman, these include an MPSP facility for coordinating business and production plans and MRP; an L/LM facility that tracks the location and age of inventory according to batch, lot or item; and an IMFP facility that includes capabilities for calculating inventory quantities to three decimal places.

MPSP costs $11,500 and will be available in the fourth quarter. L/LM costs $4,200 and will be available in the first quarter of 1986. IMFP costs $20,000 and will be available in 1986.

IBM Information Systems Group is located at 1133 Westchester Ave., White Plains, N.Y. 10604.

ARE IBM'S STATEMENTS OF DIRECTION LEADING YOU ASTRAY?

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Compare IBM's System 36 with Wang's VS, for example.

With the Wang VS, you can tie into WangNet, Wang's broadband local area network (LAN) that facilitates the exchange of data, text, graphics, electronic mail, and video information.

FEATURES	WANG VS 85	IBM SYSTEM 36
Migration without conversion up to 192 users	Yes	No
32-bit Architecture	Yes	No
Cache	Yes	No
Object Code Compatibility	VS 15, 25, 45, 65, 85, 100, 300	36 only
Virtual Memory Operating System	Yes	No
Removable Storage Options	Yes	No
Local Area Networks	Yes	No
Architectured for OA/DP	Yes	No
Relational Data Base	Yes	No
Industry de facto Standard Word Processing	Yes	No

IBM's local area network for the System 36 still isn't available.

The Wang VS family is fully compatible from top to bottom, uses one operating system, and runs all the same software without reprogramming or recompiling.

System 36, on the other hand, uses an operating system that's incompatible with any other IBM system. And IBM uses two mainframe applications—DISOSS and PROFS—that aren't compatible with each other. Unfortunately, the product that's supposed to tie everything together is still in the planning stages.

The Wang VS also offers you Wang OFFICE, a set of office automation applications that connects the VS to other Wang office systems and provides you with totally integrated information processing.

If you want IBM's version of Wang OFFICE for the System 36, you'll just have to wait for it.

JUST GIVE US ONE SHOT.

As the chart indicates, there are lots of reasons why you should choose a Wang VS computer over IBM's System 36.

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SOFTWARE & SERVICES

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standard graphics workstations, such as Tektronix, Inc. and Landmark Graphics workstations that are connected to the host computer.

The price of Cyber-Epic ranges from $50,000 to $300,000.

CDC, Petroleum Industry Marketing, P. O. Box 0, 8100 34th Ave. S., Minneapolis, Minn. 55440.

DATA BASE MANAGEMENT SYSTEMS

■ **Computer Corp. of America (CCA) has announced a marketing agreement with Decision Resources Corp. that gives CCA exclusive marketing rights to a software link between CCA's Model 204 data base management system and SAS Institute, Inc.'s SAS System.**

The Statistics and Graphics Extractor/204 (Sage/204) runs on IBM mainframes under OS, DOS and CMS environments. The interface is licensed for $12,000.

Computer Corp. of America, 4 Cambridge Center, Cambridge, Mass. 02142.

■ **Relational Database Systems, Inc. has announced that its Informix relational data base management system for AT&T's Unix environments is now available on Perkin-Elmer Corp. 3200 superminicomputers and Model 7350 supermicrocomputers.**

According to a spokesman, Informix provides a collection of programs designed to aid in building multiuser applications. Features include an interactive query language, a nonprocedural report writer, screen generation and menu creation facilities.

The price ranges from $3,000 to $12,000, depending on the host processor.

Relational Database Systems, Suite 600, 2471 E. Bayshore Road, Palo Alto, Calif. 94303.

■ **Applied Data Research, Inc. (ADR) has announced that its Datacom/DB relational data base management system can be interfaced with SAS Institute, Inc.'s SAS System.**

Proc Dbview reportedly allows users to extract data stored in a Datacom data table and to be used in a SAS program. SAS users can use their corporate data stored in Datacom/DB for statistical analysis and graphics, the company said. Data stored in a Datacom/DB table can be extracted in a format that can be read by SAS software.

It is available free to users of the Datacom/DB and SAS System.

ADR, Rt. 206 and Orchard Road, Princeton, N.J. 08540.

■ **Sir, Inc. has announced that its SQL+ relational query system is now available for Digital Equipment Corp.'s Tops 10 and Tops 20 operating systems.**

According to the company, SQL+ is a component of SIR/DBMS, a relational data base management system (DBMS) designed for analysts and researchers. SQL+ includes an interac-

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SAS from page 41

ment commands and string handling capabilities. Variables in statements can refer to entire matrices of values, allowing a single statement to operate on one value or on hundreds of values. Production release is scheduled for mainframes and minicomputers in the second quarter. It will be available for IBM's PC-DOS in the third quarter.

The initial release of SAS/IML will run under IBM's OS, TSO and CMS operating systems; Digital Equipment Corp.'s processors under VMS; and Prime Computer, Inc.'s Prime 50 series under Primos. The PC-DOS version will operate on the IBM Personal Computer AT and Personal Computer XT. Use of SAS/IML requires the base SAS System. The first-year license for SAS is $8,000 and for SAS/IML, $2,000.

SAS/AF was described by the spokesman as a full screen facility for interactive development of user applications. Using menus and screens developed with SAS/AF, users can run base SAS System jobs without knowledge of the SAS language. Procedures in the SAS/AF system allow a program designer to build screens, control the user path through an application and transport screens between operating environments.

The initial release of SAS/AF for IBM mainframes is scheduled for the second quarter. The first-year license fee is $3,000.

In addition, SAS Institute announced a computer-based training (CBT) series for the base SAS System. The initial course in the series, "Fundamentals of the SAS Software System," is designed to teach new SAS users how to use SAS directly through the SAS software. Users learn to write and execute test programs using the SAS Display Manager System, a full screen facility for interacting with all parts of an SAS job, including statements, output and system messages.

The CBT course runs under IBM's TSO and CMS operating systems. It requires installation of the base SAS System and SAS/AF. The first-year license fee is $1,500.

More information is available from SAS Institute, which can be reached through Box 8000, SAS Circle, Cary, N.C. 27511.

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Canada

SOFTWARE & SERVICES

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tive display processor for developing fully formatted reports without programming.

SIR/DBMS, including SQL+, sells for between $25,000 and $40,000, depending on hardware configuration and operating system. The product costs $40,000 for the DEC Tops 10 and Tops 20 operating systems.

SIR, Suite 400, 820 Davis St., Evanston, Ill. 60201.

■ **Four-Phase Systems, Inc. has announced that Unify Corp.'s Unify relational data base management system is available for Four-Phase's Series 2000 computers.**

Unify reportedly provides nontechnical end users with tools to design high-performance, transaction-oriented data base applications.

The Unify DBMS costs $1,995.

Four-Phase Systems, 10700 N. DeAnza Blvd., Cupertino, Calif. 95014.

■ **Lanier Business Products, Inc. has announced a data base management program for the accounting, legal and insurance professions that runs on Lanier's EZE desktop workstations.**

Datamanager II is said to enable nonprogrammers to perform data retrieval and reporting. When combined with the vendor's One-Step word processing program, Datamanager can prepare columnar reports, address labels and letters.

Datamanager II costs $1,100.

Lanier Business Products, 1700 Chantilly Drive N.E., Atlanta, Ga. 30324.

MICRO from page 41

ber-crunching strength with the micro, which, because of its increasingly powerful and functional software, has unique talents its large systems brethren do not share. It is no longer an either-or situation in information processing.

In its emerging role as central supplier of services, the mainframe can do what it does best — manage massive data bases, process huge volumes of data and serve as a distribution engine for electronic mail, among other things. The micro will handle those functions for which it is best suited — ad hoc data manipulation and local data entry and editing, for example.

Sounds idyllic, doesn't it? Well, don't expect the transformation to come overnight. Anyone who has had firsthand experience with the current generation of micro-mainframe links knows that link technology has a long way to go before it makes transparent, simple data sharing practical. As for integrated micro-mainframe applications, that's a horse of a different color, to steal from the *Ox* theme again.

Distributed applications

If link technology can be described as being in its infancy, distributed applications technology is certainly only in its first trimester. Even marketing cadres, who are quick to seize new issues and opportunities, have yet to take up the banner of applications integration in the product marketing crusades.

Thus, when one of the leading applications software companies — that's it on the clues — hinted recently that it will soon release the first products in a planned line of what it labeled distributed personal computer applications, it piqued some interest.

The company said the distributed personal computer applications are essentially subsets of its extremely popular mainframe systems. The company claims the products will allow a user to download a subset of the mainframe functions, enter and manipulate data as though working within the mainframe application, perform editing and validation functions on the micro and upload the processed information as a mass of batch transactions that will then be incorporated into the full mainframe system.

Offloaded to micro

In that way, the company postulated, a portion of the mainframe processing has been offloaded to the micro, reducing mainframe resource consumption, utilizing the local processing power of the micro and cutting direct-connect communications costs.

Such capabilities would be extremely useful for a remote corporate branch or division that could, say, download necessary general ledger functions, process its own general ledger and upload the information for inclusion in the full general ledger.

The company admitted it is taking only small steps at first — offering only the simplest of functions, such as data entry and validation — in the first wave of such distributed applications.

Not yet announced

Though the product has not yet been officially announced, it has been used by a number of the company's existing clients, who were said to be extremely pleased.

User reaction should be interesting when the products hit the open market. Many people claim that users are growing disenchanted with their micros due to the dearth of new and innovative micro-specific applications. If this is the case, the integrated applications may be warmly embraced. Much depends on how sophisticated the products are, considering they are merely the first offshoots of a new technology.

In any case, the move toward integrated functionality — where the micro is an extension and not an alternative to the mainframe — has clearly begun. It's time for the mainframe to be fitted for its Father Flanagan robes.

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Actually, I knew it all along.

Let's begin with a definition.

Return on Information Investment (ROII) means the degree to which an organization benefits from its investments in information resources. This includes computer equipment, software, and manpower.

How can ROII be improved? In large part this is a function of how information is used by your organization and how that information is created.

But for general purposes, ROII can be improved by increasing the accessibility of your information while decreasing the cost of producing and maintaining that information.

By increasing accessibility, we mean letting more people use more information more easily. By decreasing costs, we mean letting program developers, system administrators, and operations people make more efficient use of the system.

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The Development Center is a collection of GCOS 8 based software tools designed to permit your program developers to design and test applications more quickly, assist system administrators in providing better performance and control, and to assist operations in managing daily computer room activities.

And, Honeywell's design strategy for cohesive micro-through-mainframe software, networking, and computing equipment affords the long-range investment protection growing organizations need in order to keep ROII healthy in the years ahead.

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SOFTLINE from page 41

development process.

Company A

At this major "smokestack" corporation, the chief executive officer was the most visible sponsor of the executive information system effort. The CEO believed that some fundamental and important changes were under way in the industry and intended the executive information system to serve as a tool to open the minds of his fellow managers to new ways of looking at their business.

At the CEO's direction, an executive information system group was established and given what amounted to a blank check. Within less than a year, the group had executive information system workstations on the desks of the company's 20 top executives. The workstations offered a variety of standard and ad hoc reports from a broad range of financial, operating and industry data.

A system that monitored executive use of the executive information system revealed a comparatively high degree of login activity during the first two or three weeks of installation. After that, demand fell to practically nothing for nearly a year, with the exception of short, isolated bursts of activity following the end of each fiscal quarter.

A closer look at the situation revealed that the CEO's management team did not share his views on the changing business environment. They saw no compelling need for improved insight into the business and, therefore, reacted to the executive information system with indifference or resistance.

Although business changes are an important stimulus to developing a successful executive information system, good results seldom materialize unless the entire management team recognizes and accepts the change. This was clearly not the case in this instance. As a general rule, an executive information system intended to induce change in managerial behavior fails, and one that supports a recognized need for change succeeds.

Company B

The head of this leading pharmaceutical corporation's fastest growing and most profitable division commissioned the development of an executive information system, which was to be, above all else, a marketing data base. The information systems organization was charged with bringing together in one data base a wide array of industry, customer, competitive and product sales history information.

The executive information system project team ran into substantial problems with data reliability and comparability — multiple product numbers for identical products was a particularly thorny issue — and it requested and received substantial budget and schedule extensions. When the day of unveiling finally arrived, the division head posed three important questions to the new system — none of which it could even begin to answer. After additional extensions of time and budget and two repetitions of this experience, the CEO branded the effort a failure and withdrew all support and funds.

Why did the effort fail? The division was in a high-growth, high-change mode of operation. The division head and his management team, unlike the executives in the previous case, had an intense thirst for improved information to help them better understand their rapidly changing and highly competitive marketplace.

But in this atmosphere of rapid change, the managers of the division were almost totally unfocused in their information requirements. As a result, they asked for, and expected to receive, an all-knowing, all-seeing data base that could answer almost any question.

Executives in rapid-change situations have to be focused in their executive information system needs.

Company C

At this major chemicals firm, the vice-president of information systems secured senior management's support and active participation in the development of an executive information system geared to the improvement of executive productivity. As in the preceding cases, an executive information system team was established and given ample funding and time. In very short order, the executive information system group placed microcomputers in the homes and offices of the six top executives of the company.

These systems offered a combination of generalized and specifically tailored applications based on needs that were identified earlier through a series of careful and thorough interviews. The quality of the group's work was superb. They received compliments from executives using the system, as well as inquiries and requests for visits from like-minded executive information groups in other corporations.

Despite the company's senior management being highly impressed with the executive information system team and the quality of its work and the ready availability of dedicated coaching and support from the executive information system staff, the usage of and value obtained from the executive information system remained negligible in the year after its installation.

Why did this happen? The company was enjoying a relatively calm period. Its markets and competitive positions were strong. Thus, apart from their natural curiosity, the senior executives felt no pressure to modify their work styles and make use of the system. Executive information system efforts aimed at executive literacy alone are destined for a ho-hum reception.

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IN DEPTH

A Tale of Three Languages

C ADA & Lisp

By Ed Acly

Three high-level languages are attracting widespread interest because they satisfy certain requirements better than Cobol, Fortran, fourth-generation languages or application generators:

■ The C language, in association with AT&T's Unix operating system, delivers more efficient programming environments.

■ The Ada language, along with the Ada environment, applies software engineering principles to today's software crisis.

■ Lisp has been adopted by vendors in the artificial intelligence community for symbolic processing.

It is not practical to discuss C or Ada without also discussing Unix and the Ada Programming Support Environment (Apse). Just about every version of Lisp includes an environment of programming support tools. The presence of these environments for all three languages is an important criterion that distinguishes them from the traditional Cobol and Fortran languages and a strong indicator of where programming technology may be headed. These environments provide a wide variety of automated tools that were developed to allow the programmer to write, test and implement programs more efficiently.

The history and philosophy of the C programming language are closely tied to the history and philosophy of the Unix operating system. C could be viewed as the

language tool developed to implement the Unix philosophy. This philosophy calls for an operating system that is generalized, open-ended, flexible, powerful and modular.

Unix was developed by professional programmers at Bell Laboratories to provide an environment that would better support teams of programmers. Among the requirements of a better program development environment were:

- Simplicity and ease of use in order to promote the use of the environment.
- Faster, easier development of large programs, where the need for improvement was greatest.
- Portability so that the environment could be moved from one hardware architecture to another.

Unix was originally written in Digital Equipment Corp.'s assembler language. To provide portability to Unix, the C programming language was developed. Then Unix was rewritten in C with a completion date of 1973. The actual tools portion of Unix, its program development environment, started to develop at Bell Labs in 1973 as the PWB/Unix version. Today, the C compiler and the Unix tools are all part of what is marketed by AT&T as System V.

By definition, the C language is a general-purpose programming language. As both a high-level and low-level language, C allows the programmer to access machine facilities when required, while freeing the programmer of many of the housekeeping chores of assembler language. The primary features of C are:

Brevity of expression. C is a small and concise language. It only has 30 reserved words. For example, C does not include I/O facilities or operations, formatted files, character strings or lists. High-level functions not present in the C language are provided by functions that are external to C. This brevity tends to make C easier to learn and understand. On the other hand, the same brevity of expression allows a great deal of meaning and functionality to be packed into a very small amount of code. This is a very powerful attribute, but if not properly used, it can lead to code that is obscure and confusing.

Functions. A function is the equivalent to the subroutine from other languages. It is a self-contained piece of code that performs some unit of work. Functions are an extension to the C language and provide the high-level functionality needed by the programmer that is not part of the C language.

A well-designed C program is modular. The large problem to be solved by the program is broken down into smaller tasks, with a function used for each. The C program becomes a grouping of functions that are strung together to produce the desired results. By writing functions to be general purpose and then feeding them parameters at runtime, code can be reused from one program to another. The library becomes a depository of predefined program portions or of software tools.

Abundant set of operators. The C language presents a wide variety of operators, allowing it to be mapped very closely to the processor on which it is to be run. This variety of operators, which match closely to the common operation codes of most processors, ensures a one-to-one translation between C and the host operation codes.

Portability. A number of the other features of C contribute to its portability. For example:

- C's brevity makes it easier to port from one processor architecture to another. This brevity also makes new compilers easier to write.
- Features that are specific to a processor architecture are generally isolated as functions in the runtime library. Then, porting requires the rewriting of nonstandard functions stored in the library.
- C's low-level operators are simple and correspond closely to the machine language operators common to most processors.
- C deals with simple objects, such as bits, addresses and numbers. C does not deal with data files or character strings.

Control structures. The C language offers the modern control structures required for structured programming. Included in these control structures are:

- Decision making (if, else).
- Choosing from possible alternatives.
- Looping (while for, do).
- Go to.

These control structures allow for the single-threaded execution of instructions. They do not provide for multiprogramming or parallel operation of synchronized tasks.

Flexibility. Compared with other high-level languages, C does not present a rigid set of rules that the programmer must follow. C imposes few restrictions; it will allow the programmer to do almost anything desired. This means that the same results can usually be produced in a number of different ways. A program can be structured or unstructured; it can be efficient or eloquent.

Important points

Although the C language is not yet an Ansi standard, the version of C provided by AT&T with Unix is the de facto standard.

Despite the fact that Unix so heavily influences the C standard, the language lives a life all its own. C compilers are available for nearly every major operating system. The reason for this is due to C's popularity with systems programmers.

C is a language to be used by professional programmers working at the systems level. It is not well-suited to beginning programmers. It will probably never replace the Cobol or Fortran used for business applications. Currently, a great deal of

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commercial systems software is being written or rewritten in the C language. C has the potential to become the standard for systems programmers.

C programs can be well-structured if good programming techniques are adhered to because the common control structures required are all present in the language, and functions allow the program to be split into independent sections, which can separate the detail of the program from its main flow.

DOD's Ada

Ada was designed and developed under the sponsorship of the U.S. Department of Defense (DOD) specifically for embedded computer systems. An embedded computer system is one that is part of and dedicated to a larger system — for example, an aircraft or missile whose main purpose is not to perform computation. This definition of an embedded computer system rules out those used for scientific research and commercial data processing operations whose main purpose is to perform calculations.

In sponsoring Ada, the DOD was reacting to what has been termed the "software crisis." DOD studies in the early 1970s saw a dramatic escalation in software costs, to the point where the cost of software had become more than that for hardware. Even worse, projections through the '80s saw the cost of software in extreme cases approaching 90% of the total cost for embedded computer systems. Ada was developed in order to provide a means to decrease the cost of software for embedded computer systems.

Symptoms of this software crisis at the DOD were quite similar to those experienced on the outside, namely that software was:

- Very expensive, with costs too often exceeding estimates.
- Not responsive to user requirements.
- Inflexible.
- Not easily modified.
- Not reusable from one system to another.
- Not reliable.

> ❝
> *At the root of all these symptoms was the failure to manage effectively the complex solutions that were required for embedded computer systems.*

At the root of all these symptoms was the failure to manage effectively the complex solutions that were required for embedded computer systems. As the power of the computer grew and its costs decreased, increasingly complex applications of computers were demanded. The software methodologies and tools were not in place that would allow complex solutions to be properly engineered and managed in order to deliver a reliable product. Methodologies and tools being used were too dependent on manual activities and coordination. At the same time, the balance had swung to the point where computer resources were now cheaper than manual resources.

New methodologies, tools and a language were needed to make heavier use of the computer and thereby decrease the cost of software. Accordingly, the DOD began work on Ada as the vehicle to control its escalating software costs. With Ada, the DOD would promise two distinct products: a new, common, high-order programming language that would embrace, and even enforce, modern programming practices; and a complete programming support environment that would embrace modern software engineering principles and tools for software development, maintenance and support.

Because Ada embraces both a language and a programming support environment, the remaining sections on Ada cover both of these topics.

Ada's history

The most striking feature in the history of Ada is the central role of software engineering. Software engineering strives to bring discipline into the process of producing software by applying classical engineering principles to software production. Means to this end include the introduction of a consistent methodology and a set of automated tools to control the complexity of the software life cycle.

Software engineering is ingrained within Ada. Ada was developed by software engineers. The process used to specify and design the language followed accepted software engineering principles. The language incorporates features required to implement software engineering techniques easily.

In December 1980, Ada became a military standard. Subsequently, the DOD established the Ada Joint Program Office, whose goal is to manage the implementation of the Ada language and program support environment. The Ada Joint Program Office spearheaded the effort to have Ada accepted as an Ansi standard. Starting in 1981, the program office managed further programs aimed at submitting Ada to more international review by language experts.

This process caused further changes in Ada until February 1983, when Ada was accepted as an Ansi standard. This Ansi standard is frozen until 1988, when it will be reviewed once again based on the experience to date. Efforts are currently

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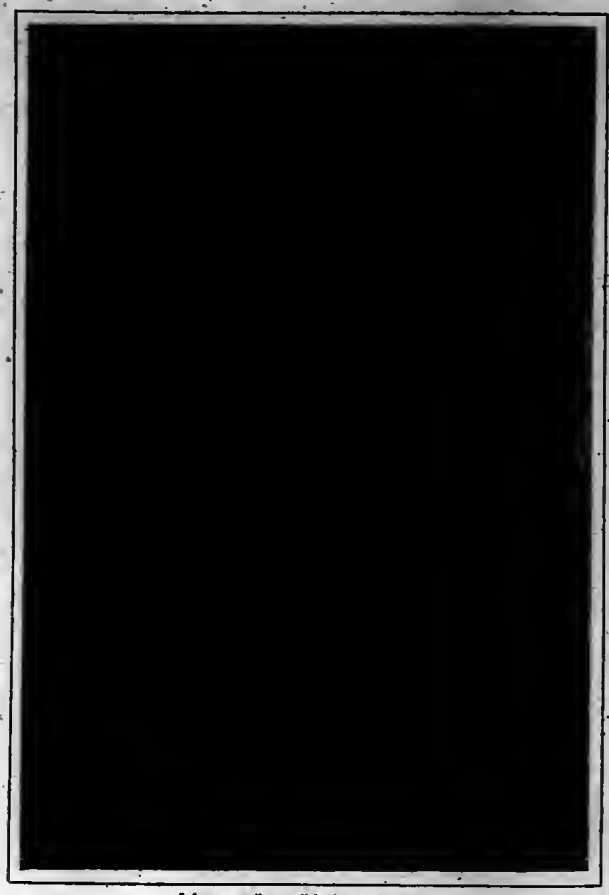
IN DEPTH/THREE LANGUAGES



Ada compiler validation schedule

well under way to have Ada accepted as a standard by the International Standards Organization.

In June 1983, the DOD issued a directive that put some muscle behind the effort to make Ada a standard. This directive was a revision of DOD directive 5000.31 and reads in part as follows: "The Ada programming language shall become the single, common, computer programming language for Defense mission-critical applications. Effective Jan. 1, 1984 for programs entering Advanced Development and July 1, 1984 for programs entering Full-Scale Engineering Development, Ada shall be the programming language. Only compilers which have been validated by the Ada Joint Program Office shall be used for software to be delivered to or maintained by the government."

The significance of this directive was twofold. First, it became quite clear that DOD contractors would have to adopt Ada for future work. Second, "Ada" was registered by the DOD as a trademark. Accordingly, a compiler could only be marketed as an Ada compiler after it had received DOD approval.

Enforcing compliance

This approval or validation process is the method chosen by the DOD to enforce the compliance of all Ada compilers with the standard language specification. Under no circumstances will the DOD allow any subsets or supersets of the Ada language to exist. In order to be validated as Ada by the DOD, a compiler must pass all tests in the Validation Test Suite, currently consisting of more than 2,200 programs. Once validated, a compiler must be resubmitted for revalidation once a year. If a compiler does not pass all tests in the suite, the DOD will not allow it to be called "Ada."

Because of the complexity of the language, only now are production-quality compilers beginning to arrive in significant numbers. To be classified as production quality, a compiler must implement the full language and must produce efficient machine code. The compilers currently validated or scheduled to be validated are shown in the table above.

The standardization of Ada as a common, high-order language provided the framework to develop the second Ada product, the programming support environment. This consists of a set of automated tools and the means to integrate them in order to provide complete life-cycle support. The objective of the DOD is once again to lower software life-cycle costs by providing an environment and user interface that is common (portable) for systems development personnel across all hardware architectures.

Features of Ada

Members of the Ada culture profess that Ada, if implemented on a wide-scale basis, will revolutionize the entire software industry. Their claim is that no single cure will solve the software crisis.

On its own merits, neither an automated programming technique, a new programming language nor the

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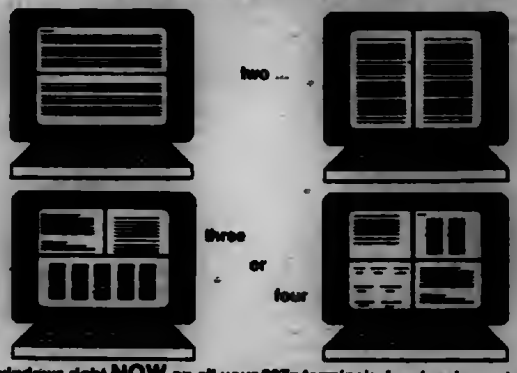

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practice of software engineering principles is the answer. Rather, a holistic approach is required that will bring together all of the above.

The goal of the Programming Support Environments is to provide an integrated and standard set of tools that assist in all phases of the software life cycle — that is, they can be used during requirements analysis, specifications, detailed design, implementation and maintenance. The key attributes are:

- Integration — the tools all work together.
- Comprehensive scope — tools are available to help automate the entire software life cycle.
- Standardization — a common interface is provided between the tools and the host operating system. The tools request operating system services from this interface and not from the operating system. This allows the environments to be portable from one proprietary operating system to another.

In the Programming Support Environments, the center is the host operating system, which is encapsulated by the Kernel Ada Programming Support Environment (Kapse). Within the Kapse are the services usually requested from the processor's operating system. It supports the rest of the environments by providing a processor-independent interface. This interface appears standard to the outside world from one hardware architecture to another. This means that while the Kapse is not portable, it allows all other elements to be portable — that is, the same — no matter what the underlying processor.

The next layer out is called the Minimal Ada Programming Support Environment (Mapse). This layer contains the minimal set of tools required and adequate to write and maintain software. These are:

- Ada compilers and cross compilers — used for both the host and target processor.
- Configuration control tools — used to control the configuration of large projects.
- Command language processor — very similar to that provided on Unix systems. In fact, in some environments it will be modeled directly after Unix. Unix-like features found here will include things such as shell scripts, I/O redirection and pipes.
- Control flow static analyzer — used to chart the topography of program control.
- Dynamic analysis tool — used for testing to provide facilities such as program breaks, tracing, snapshots, execution timing and stub creation for unfinished programs.
- Data base manager — provides the integration needed to interface the many tools with each other. The data base stores information for a project for its entire life cycle. History for the objects in the data base will need to be stored long enough to let any object be re-created when required. Sufficient information must be stored to provide for reporting of project management.
- Debugger.
- Editors — used for source programs, general text, specifications documents and design documents.
- File administration tools — used for file backup, archiving and processor transfer.
- File comparison tools.
- Linkers/loaders — used for both host and target machines.
- Pretty printer — used to format text data stored by the editor for output. The format depends upon the type of text.
- Program analysis tools.
- Set-use static analyzer — used to produce a cross reference listing telling where data is both referenced and updated.
- Terminal interface routines — used as device handlers for different terminal types.

The Apse layer contains additional tools to support the systems analysis and design phases, as well as any other areas of the life cycle not covered by Mapse tools. Areas covered by the Apse tools include:

- Ada program editor — used specifically for Ada coding and providing aids to ease this process.
- Configuration control tools — more advanced than those provided in the Mapse.
- Documentation tools — used to produce and control project documentation.
- Fault report system — used to process change requests and error reports.
- Program design tools.
- Project management — used to track projects and their due dates, the comparison of actuals to budget and so on.
- Requirements analysis tools.
- System design tools.
- System specification tools.
- User-supplied tools.

The benefits from the implementation of a full Apse will be felt throughout the entire software life cycle.

Few organizations have achieved adequate management control over the software life cycle. Tools currently available, because of their lack of integration, do not provide adequate measurement and control of the cycle.

Today, the business and systems analysis functions are predominantly manual. This results in an extremely time-consuming process if a thorough or less than thorough job is done because of pressures to comply with the schedule.

Many of the tools in Ada are aimed at providing assistance to the programmer. This is the same area toward which many of today's tools are targeted.

Consequently, cost savings in this area may not be as great. However, many of today's tools may be integrated into the Apse.

Maintenance today is all too often haphazard, relying upon testing to substitute for some good up-front

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planning. The configuration control tools of the Apse are aimed at decreasing the cost and improving the quality of maintenance.

Ada facilities

Examples of Ada facilities that are needed for embedded systems and that are not found in popular languages such as Cobol and Fortran are:

Parallel processing. More than one portion of a program, a task, can run independently and concurrently. This allows the program to interface simultaneously with more than one device or to execute simultaneously on more than one processor or to just run faster. Information can be passed between tasks through a mechanism called a rendezvous. Control of the parallel tasks is handled transparent to the application program by the Kapse. Other programming languages must call operating system services in order to process in parallel.

Real-time capabilities. Embedded systems require that responses be issued rapidly enough so that the input to the system upon which a programmed decision was made is still true. In addition to speed of execution, Ada's real-time facilities include functions such as the start of a process at a predefined time or the repetition of a process at predefined intervals.

Exception handling. Embedded systems controlling weapons cannot abort or give up control to the operating system when an unexpected condition, an exception, is encountered. On the contrary, the application program must have the ability to react directly to the exception and, thereby, to recover from an error. Ada provides powerful facilities to allow the application program to handle exceptions. However, the option is still left open to defer an exception to handling by the operating system.

User I/O. Embedded systems are often connected directly to specialized I/O devices, such as sensors, to measure air speed or actuators to open and close valves, for which there are no provisions in the Ada language. Because of the rapid response required in the real-time environment, the I/O devices often communicate directly with the application program rather than expending the time and instructions for the application program to request I/O services through the operating system. In addition, embedded systems often do not employ file structures that are dependent upon the operating system, because the embedded system is executed without the support of an operating system.

In order to deliver cost-effective systems, the Ada language was designed to incorporate software engineering principles that became popular in the '60s and '70s. It was felt that the application of these principles, all contained in one product, would produce systems that are reliable, efficient and modifiable.

Packages. To better manage large software projects, software engineering employs two methods — abstraction and decomposition. Abstraction refers to the

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> *Even though Ada product implementation will span the remainder of the decade, Ada's success is already guaranteed based solely on the DOD market.*

logical simplification of a complex problem by focusing only on its essential components while deliberately ignoring the nonessential detail. The Ada package supports both abstraction and decomposition. Ada packages are combined to make Ada programs. The package is separated into two distinct parts:

■ The specification declares the package's interface to other packages. It is the logical requirements, the "what" for the package. It contains the data visible to the package's users.

■ The implementation gives the procedures (accompanied by any internal data required by the procedures) needed to implement the specification. It is the procedural details, the "how" to accomplish the specification. It contains details that are hidden from its users. Any internal data used here can be encapsulated. This protects the internal data from erroneous updating by other packages in the program.

Strong data typing. This means that the programmer can specify in more detail the type of data (allowable values and operations) that a data field can contain. For example, for the description of the MONTH field, the acceptable values could be explicitly given as JAN, FEB, MAR, APR and so on.

Separate compilation. Ada does not require that the entire package or program be compiled at one time. Rather, the specification and the implementation portions of a package can each be compiled separately. This allows the "what" of a process to be compiled separately — for example, early on during the system design phase, from the "how" of that same process.

Generic units. The objective of a generic package is to produce a generalized program unit that can then be tailored to a specific use at compilation time when parameters are supplied. The payback from generic units is that a package can be created once in a generalized format and then tailored to serve many different purposes at compilation time.

Combining the features discussed so far, Ada proponents predict that Ada will revolutionize the software industry because it will provide for the first time a sound structure for the reuse of software. They see Ada moving the industry toward industrialized programming where programs are built from components selected from a software library.

No longer will the writing of a program generally entail starting from scratch. The ability to construct programs from already available, reusable components will have the greatest impact on productivity. In evaluating this prediction, consider the basis for the claim:

■ Portability is built into both the Ada language and environment.

■ Ada packages and program units can be independently developed and programmed.

■ Interface specifications between packages can be carefully engineered and cataloged.

■ Independently developed packages and program units could be combined, once large software libraries are developed, to form a large part of programs that need to be developed.

■ Generic program units could be developed and cataloged to process common functions.

Many of the features discussed above will be implemented during the remainder of the 1980s. In 1984 a number of production-quality compilers arrived. This year should be marked by the arrival and first use of

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We have examined the Datasouth TX-5180 and found its features and characteristics exceed accepted expectations for IBM 34/36/38 printers. A partial list follows.

- ☐ Tabletop, impact matrix serial printer
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- ☐ Tractor feed forms: 3"-15"
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the DOD-sponsored Mapses. It is likely to take the remainder of the decade for fully functional Apses to arrive. Probably the key element for the Ada environment is the Mapse data base. In order to act as the repository of project data for the full life cycle, complex relational data base technology will probably be required. It could take until 1990 before this technology reaches full production quality.

Even though Ada product implementation will span the remainder of the decade, its success is already guaranteed based solely on the DOD market. Currently, Ada is specified for 37 different application systems in the Army, Navy and Air Force with a combined contract value of $307 million. The number of systems using Ada is expected to grow rapidly, reaching a contract value of $1.3 billion in 1990.

These figures are just for DOD work. They do not include any other government or private systems where Ada might spill over. In addition, Ada has a wide international commitment. It will likely become a military standard for many of the Nato countries, and in many respects Ada's commercialization in Europe is ahead of that in the U.S.

The success of Ada in the commercial world is by no means guaranteed and will evolve at a much slower pace. The features of Ada will make it more attractive for some applications than for others. For example:

- Real-time applications such as industrial process control.
- Factory automation.
- Health care and medical systems.
- Banking and financial applications.
- Large projects with many programs and many activities that must be coordinated.
- Applications with a long life during which considerable maintenance must be done.

Since Ada is not mandated for the commercial world, a great deal of product development will be required before its degree of success can be clearly predicted. Quite likely, Ada will be used initially by DOD contractors for nongovernment contracts on which they are working. Ada's success here could determine how rapidly its commercial use spreads.

Productivity gains from the use of Ada will be slow at first. Because Ada's way of doing things is so different, it will take several years just to build up the nucleus of trained personnel to allow for increased productivity. More importantly, reusable software components will only develop as a result of Ada projects. Thus, productivity gains due to reusable software will have a snowball effect.

Lisp language

Lisp (short for list processing) was developed in the late 1950s by John McCarthy at MIT to meet the unique requirements of artificial intelligence and symbolic processing. Lisp was the first high-level computer language to focus on the manipulation of nonnumeric, symbolic data and objects, rather than on the manipulation of numeric data. The facilities of Lisp are used to represent and manipulate knowledge based on its symbolic representation.

There is no one standard version of Lisp. Lisp has remained popular in the AI community because it provides the basic building blocks from which other AI languages and tools can easily be built. In the U.S., Lisp and its derivatives appear entrenched as the AI languages of choice.

> ***Because Ada's way of doing things is so different, it will take several years just to build up the nucleus of trained personnel to allow for increased productivity.***

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Lisp is an applicative language. This means that it is structured around applying functions (operations) to a linked list of arguments that accompany those functions. A Lisp program is simply a series of function calls or requests to perform operations. If required, the function calls are preceded by any needed function definitions.

Execution of a Lisp program consists merely of the evaluation of each function call in the sequence it is presented, based on the functions defined and stored by the Lisp system. Each function call results in a Lisp value being returned by the system to the caller of the function. In addition to list processing, limited capabilities are present to manipulate characters and numbers.

A function call or function definition is only coded in the syntax of a list, which can be of an indefinite length. Thus, the list is the only data structure for a Lisp program. The syntax of a list starts out by naming the function (operation) to be performed, followed by the arguments that are to be fed to that function using full parentheses. When the function is executed, its arguments are first evaluated to determine their actual value. When the evaluation is complete, values of the arguments are used to invoke execution of the actual function.

As an applicative language, the focus of Lisp differs from most other programming languages, which are primarily composed of statements that freely route control from one portion of the program to another and concentrate on the assignment of values to variables. Most dialects of Lisp provide for simple control structures. These control structures are also coded as function calls in the list format. However, Lisp places its greatest emphasis on recursion as its primary control structure for repetitive processing.

Lisp includes list manipulation functions that allow for the creation, modification and destruction of lists. This is possible because of:

- The simple, structured syntax for all Lisp functions.
- The flexibility of the list syntax allowing the list to be of an indefinite length and the number of arguments for a function to be of an arbitrary length.
- The ability of Lisp functions to create and return a function in any data structure format.
- Both programs (function executions) and data being represented and stored in the format of lists (both are treated as normal data objects). This means that programs can be modified as data, and data can be executed as a program. One Lisp program can dynamically create and then execute another Lisp program.

These list-manipulating functions allow lists to be combined, taken apart or changed to form any desired data structure. Primitive data structures are combined in a list to form more complex data structures. This combining can continue to form as complex a data structure as required by the application.

Many of the Lisp dialects include programming environments. Programming tools typical of a Lisp environment are predefined functions — an editor, debugging aids and a compiler to allow the creation of machine code in place of the interpretative functions when efficiency is important.

The impact of Lisp on end users through internal application development using the language is likely to be limited. Rather, as AI application systems become more capable and widespread, they are likely to be written in Lisp or one of its derivatives and sold as turnkey packages. Users will then be in a position to interface with the application through user-friendly front ends rather than by actually programming in Lisp.

The need for user-friendly front ends is recognized by AI vendors. Several application-specific front ends have recently arrived on the market. Expectations are for more universal front ends to be brought to market. Vendors recognize that the absence of user-friendliness will limit the spread of AI applications.

About the author

Ed Acly is a senior consultant for International Data Corp. (IDC). This article is excerpted from the "Emerging Programming Languages" research memorandum prepared by IDC for its User Services clients. The full report can be ordered from IDC, 5 Speen St., Framingham, Mass. 01701.

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9:00-9:15	Welcome
9:15-9:45	Personal Computing 1985: User Presentation on Recent Trends in Corporate Personal Computing
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IN DEPTH

Going with a standard

By Tony Bolton

But which one?

Which way to go for a local-area network standard for the office? IEEE 802.3 CSMA/CD—(Ethernet-type) has been the usual choice, but a vendor says that as offices increasingly suffer the communications problems of the factory, IEEE 802.4 token bus broadband networks make sense.

Local-area network users and vendors typically perceive standardized networks as having two separate and distinct application environments: IEEE 802.3 CSMA/CD networks (Ethernet-type) have a comfortable niche in the office, and IEEE 802.4 token bus broadband networks are suited principally for the factory. However, the rapidly changing office environment, along with reduced costs and greater sophistication of IEEE standard token-passing networks, are causing these conceptions to change.

Among the early developers of CSMA [carrier-sense multiple access with collision detection] networks were major office automation vendors who knew and understood office equipment. Just a few years ago, the processing environment of the typical office was dominated by the mainframe, and communications consisted primarily of batch transactions with very limited interactive processing between stand-alone word processing systems and the like. As a result, most local-area networks sold in the office environment to date have provided point-to-point, host-to-terminal connections for inconstant and "bursty" network traffic, which is precisely the kind of traffic that CSMA/CD networks best handle.

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But is this the automated office of today and, more importantly, tomorrow? The office environment is changing: personal computers and distributed workstations have led to more decentralized, local processing. At the same time, an increasing number of data processing and MIS systems have high-speed, synchronous data transmission requirements.

This equipment is available from a variety of vendors, most with incompatible communications protocols. In fact, the office is now a sophisticated complex whose communications requirements are drawing increasingly closer to those of the factory.

The factory has always consisted of diverse equipment from multiple vendors. This equipment is located throughout the facility in pockets, or islands, which function as relatively autonomous groups in a distributed processing fashion. For instance, production, material and quality control information typically originates in the MIS/DP environment, while the engineering drawings and programs used to specify and control manufacturing processes on the plant floor originate in engineering offices and computer-aided design and manufacturing centers.

Current products meet two IEEE 802 standards.

Clearly, one of the objectives in the factory is to integrate these islands of automation by providing immediate access to shared data, thus supporting real-time decision making by management and on the plant floor and ensuring the smooth control of manufacturing operations without costly downtime. Likewise, as the hardware and software in the office complex become more sophisticated and less expensive, with more reliance on local processing, the need to access shared data increases.

Furthermore, as communications involving digital images, virtual terminal and large file transfers become more common in the office workplace, the nature of the communications link begins to resemble the real-time, constant and interactive communications flow of the factory. It is important, then, to examine the technologies behind the IEEE 802 standards in light of current and future application requirements, without preconceptions as to the traditional market alliances of the past.

IEEE 802 standards

The IEEE 802 project has focused its effort on standardizing the lower two layers of the open systems interconnection (OSI) reference model. To date, networking products meet two of the IEEE 802 standards for media access control (see figure).

Common elements of these access methods include data rates of between 1M and 20M bit/sec, decentralized control over access to the network and robust error detection via a 32-bit frame check sequence. The differences between them, however, result in strengths and weaknesses that should be matched to the application and the network environment.

The IEEE 802.3 CSMA/CD access method uses a bus topology so that all stations on the baseband cable can simultaneously hear all transmissions. If a station detects activity on the network, it waits to transmit until the network is free.

When initiating a transmission, the station monitors the network to determine if another station began transmitting at the same time, which results in a collision. If stations detect a collision, both wait unequal amounts of time before attempting to transmit again.

Token passing

Token passing is the access method specified in the IEEE 802.4 standard. It employs a special data frame, called a token, which continuously circulates among all stations on the medium. A station can transmit data only when it holds the token. A station can only hold the token for a fixed maximum amount of time, which gives an upper bound to the length of time any station must wait before gaining access to the network. This is what makes token passing deterministic in nature, as opposed to the contention-based access of CSMA/CD networks.

CSMA/CD networks are useful in situations where network traffic is bursty and frame arrival times are not critical, such as in asynchronous terminal communications. Under light loading conditions, users have very rapid access to the network. As a result, CSMA/CD networks are often found in an environment that does not require constant or time-critical communications or high network loads.

However, as network use increases with the addition of more asynchronous terminal users, increased distributed processing and the rise in high-speed, synchronous transmission requirements such as IBM 3270 communications, CSMA/CD networks present several problems.

Because CSMA/CD's collision-detection method does not guarantee that further collisions will not occur when a station makes repeated attempts to access the network, the network cannot supply an upper bound on the time required to transfer data, which makes it difficult to monitor or manage network flow reliably.

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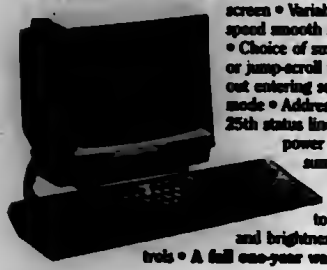

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In addition, as the load on a CSMA/CD network increases, collisions increase exponentially. This increase can cause sudden decreases in network performance just when the network is busiest. The threshold at which CSMA/CD networks become inefficient because of repeated collisions is calculated to be about 30% of maximum capacity, which is the recommended guideline for *average* system load.

In contrast, because stations on a token bus network are limited to an upper-bound time in which they can hold the token, delays in accessing the network can be reliably calculated. A further advantage of token bus networks is their ability to prioritize data frames and stations on the network. Critical users can receive increased access to the network by lengthening the time they are allowed to hold the token.

In addition, the 802.4 standard defines four priorities of data frames, a technique that ensures that the network will always transmit high-priority frames and shed low-priority frames in descending order as network load increases. The ordered, predictable nature of token passing is one of the principal reasons factory users have chosen this access method for their time-critical operations.

Network length

CSMA/CD's requirement that all stations must be able to listen to the medium before and during data transmission affects both the length of the network and the size of transmitted data frames. To compensate for the time it takes a station to listen to the length of the network, the 802.3 baseband standard specifies a minimum frame size of 512 bits. At a data rate of 10M bit/sec, this large frame size is necessary so that if a station at one end of the network begins to transmit at the same time as a station at the other end, their messages are guaranteed to overlap so that the collision can be detected.

This process becomes impractical on baseband networks with lengths greater than 2,500 meters. The IEEE 802 committee is expected to propose nearly identical limits to the broadband CSMA/CD standard it is currently reviewing. Because token passing does not require collision detection to access the medium, messages can be of any length, and network size is limited only to the time it takes the token to circulate around the network.

Baseband coaxial cable, specified for the baseband versions of CSMA/CD and token bus networks, can run longer distances than the shielded twisted-pair wiring common to private branch exchange (PBX) systems but is not as immune to noise. In order to preserve the transmission properties of the cable, there are specific constraints placed on how and where network interfaces attach to the cable.

> ***The threshold at which CSMA/CD networks become inefficient because of repeated collisions is calculated to be about 30% of maximum capacity, which is the recommended guideline for average system load.***

For instance, the 802.3 CSMA/CD baseband standard gives specific intervals for tapping into the cable, and access units and drivers must be located right at an active tap. In addition, to add stations to a CSMA/CD network (as long as the 2,500-meter maximum network length is not exceeded), special drop cables are required to connect the station to the active tap on the main trunk.

Broadband coaxial cable, specified in only the 802.4 token bus standard, has superior frequency handling characteristics, can run distances up to 25 miles and provides excellent immunity from noise interference.

Drop cables as long as 30 meters can connect stations to the main trunk.

Most important, however, is the bandwidth it provides. In contrast to single-channel baseband coaxial cable, broadband provides multiple channels that can carry signals from several networks, as well as other applications such as voice and video, simultaneously.

In broadband systems, remote stations use lower ranges of the broadband frequency to transmit data to a common central point, called the head end, while signals traveling away from the head end to the remote sites use higher frequency channels. A remodulator is located at the head end to receive upstream signals and remodulate them to a channel in the downstream direction.

The flexibility of broadband cable

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is important in the office complex. In addition to handling data communications, a single broadband cable can provide the backbone for networking all types of communications — teleconferencing, PBX systems, closed-circuit TV, educational telecasts and CATV.

The use of a standard wall-mounted outlet eliminates the need to rewire offices every time a new network station or system is installed. Instead, drop cables can connect the new station or system to a passive tap on the trunk cable. Because broadband cable is not subject to the same distance limits as baseband, network users can choose to wire their entire building complex to allow for relocation of individuals and equipment, as well as future growth.

The major costs of a network derive from the backbone media hardware and the communications interface components. Typically, broadband systems are more expensive than baseband systems, particularly in smaller installations where the required head-end remodulator and amplifiers (if necessary) represent a large percentage of the total system cost.

in larger installations, however, the costs of 802.3 baseband coaxial systems and 802.4 broadband systems become nearly equivalent because of the high cost per meter of the 50-ohm coaxial cable, special drop cables and active taps required by 802.3 CSMA/CD systems. Installation costs are roughly equivalent, although broadband systems may require some preinstallation design, which could add to the cost.

The major cost distinction between the two types of networks, then, is the cost of the communications components, which typically ranges between $500 and $1,000 per connection. The codification of CSMA/CD technology in the IEEE 802.3 standard, as well as its acceptance, has led to low-cost, very large-scale integration (VLSI) implementations of the CSMA/CD protocol. As a result, a variety of vendors now offer CSMA/CD communications components, and users are directly benefiting from low-cost products attributable to competition, as well as a variety of enhancement options, such as bridges and gateways between separate networks.

> *The use of a standard wall-mounted outlet eliminates the need to rewire offices every time a new network station or system is installed.*

The IEEE 802.4 token bus standard was approved by the IEEE 802 committee just three months after the 802.3 CSMA/CD standard and has since generated a high degree of interest among network users and vendors. Cost per connection for token bus networks is now slightly higher than CSMA/CD networks, but VLSI implementations are on the horizon.

The cost of an IEEE 802.4 token bus network will follow a downward cycle comparable to that of CSMA/CD networks. In addition, plans are already under way to develop bridges that will enable the token bus broadband network to serve as the backbone network in the office complex, as well as a general-purpose communications network.

The predictable and ordered nature of token passing readily lends itself to network management. Because a well-defined set of protocol rules is used to detect and resolve system errors, each network station can easily track and report errors. In addition to monitoring the behavior of the basic token-passing access protocol, network managers can monitor the load on a network (and invoke the priority mechanisms available to them before high network loading becomes a problem) or configure the network to do this on an automatic basis.

Choosing the right network

Just as the flexibility and multipurpose applications of broadband cable, combined with the distinct advantages of the token-passing access method, provide specific benefits to the factory, they readily lend themselves to the changing office environment. Data communications managers in the office complex, therefore, must look again at their networking requirements now and for the future. One thing is certain in this dynamic environment: Once a local-area network is installed, system requirements are bound to change and user expectations will increase.

Thus, network performance is a critical consideration, and other factors, such as expandability, network length, network load, cost and management tools, are equally important. While CSMA/CD networks have a strong foothold in the office today, the advantages of token bus networks ensure that both types of networks will peacefully coexist there in the not-too-distant future.

About the author

Tony Bolton is director of product management, planning and marketing for local-area network products at Concord Data Systems, Inc. in Waltham, Mass. Bolton oversaw the development of Concord Data's Token/Net local-area network, the industry's first broadband token bus network to meet the IEEE 802.4 standard.

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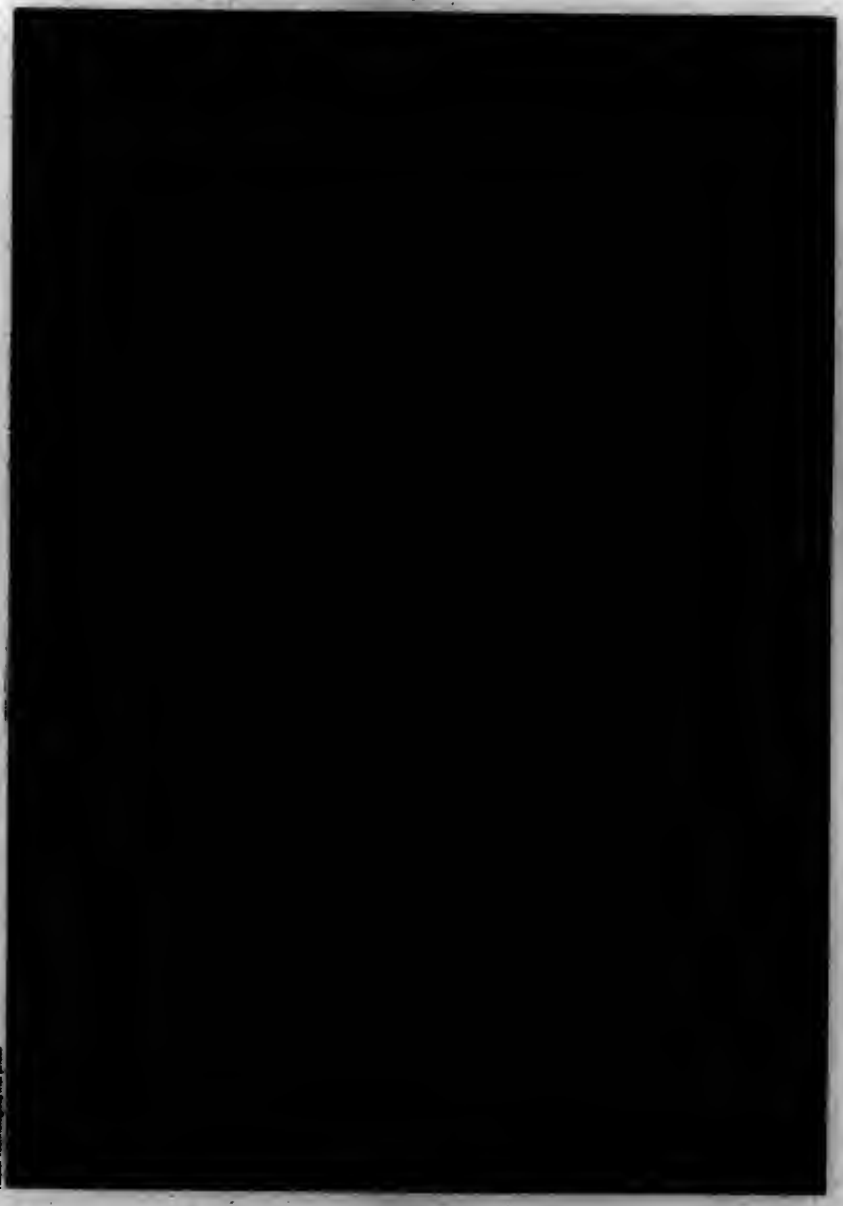
Special Report

Computerworld
March 25, 1985

Graphics Systems

Form and function



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Special Report

Hardware to capture spotlight

Chip-level advances, laser printers, nets stealing software's thunder

By Edward Warner
CW Staff

While the story of microcomputer graphics has been one of graphics applications software, analysts say that in the next year or so it will be hardware's turn to take the stage.

One of the reasons for this turnaround is that graphics software will become available as firmware on read-only memory chips, greatly increasing the speed of execution of graphics functions.

In addition, advances in peripherals will occur with the arrival of low-cost laser printers that truly integrate graphics with text. Also coming onto the hardware front is the use of local-area networks, which will make possible the sharing of those printers and plotters.

The greatest hardware advances on the near horizon, though, will come at the chip level, according to analyst Stanley Klein, president of Technology & Business Communications, Inc. Included, he said, will be more widespread use of the 32-bit microprocessor, which will accelerate program execution, and the use of denser random-access memories (RAM), including 1M-byte RAM chips. Such RAMs, Klein said, will speed graphics — or any other program — by allowing more of it to reside in working memory, rather than on a disk.

Another major advancement at the chip level will be the incorporation of graphics functions on silicon chips, Klein noted, especially in the area of computer-aided design, the most often used form of computer graphics. Two firms, Weitek Corp. of Sunnyvale, Calif., and Silicon Graphics, Inc. of Mountain View, Calif., have already introduced boards incorporating some of the basics of CAD software. This year, Manufacturer's Consulting Service, Inc. will release firmware containing the basics of its CAD programs, Klein said. In addition, MCS, Inc. of Irvine, Calif., publishes the Anvil 4000 and Anvil 1000 CAD packages.

Putting the basics of CAD onto a chip, explained industry analyst Carl Machover, frees software to be programmed for more complex functions and, most importantly, allows the program to run faster since it would not need to interact with the disk. New releases of the software would not affect the firmware, since the basic vocabulary of design remains the same, said Machover, president of Machover Associates Corp., a White Plains, N.Y.-based consulting firm specializing in computer graphics. Looking toward the more distant future, "some of us are talking about putting a whole CAD package on a chip," he said.

Already, Machover noted, one vendor is offering a coprocessor for minicomputers that is said to provide for program acceleration. Meanwhile, Mega Tech Corp. of San Diego, Calif., and Lexidata Corp. of Billerica, Mass., have developed CAD hardware with what Machover called "picture enhancement features." On the personal computer side, a hardware box is available that provides for basic line drawing, a CAD function once found only in software, he said.

Whether with a personal computer or a mini, users can soon expect firmware and denser RAMs to provide "performances that are several orders of magnitude faster than what you can expect to get out of pure [CAD] software," Machover said.

The hardware for output and display of graphics is also getting better and cheaper, according to graphics analyst Alan Paller, president of AUI Data Graphics in Washington, D.C. Within a year or so, he observed, users will see the spread of low-cost laser printers that have the capability to produce both graphics and text. Already, he said, the Apple Computer, Inc. Laserwriter, introduced in January, is a harbinger of that trend.

Users also will see the development of high-quality black-and-white dot matrix printers with an output of up to 250 dot/in., up from the current high of 200 dot/in., Paller predicted.

Another genus of printers set to make a big splash, Paller added, are those using high-quality color thermal transfer. Currently, he noted, one of the few such printers is the D-scan machine marketed by Seiko Instruments, Inc., priced at approximately $8,000. "Inexpensive color hard copy is one of the real needs," analyst Klein observed.

Klein also predicted that "amazing" price reductions would continue in the graphics peripherals market.

Whether laser or color thermal, the new generation of printers will still be costly and, as Paller observed, the spread of local-area networks will be an indirect hardware boon to graphics. "You can ruin the value of hard-copy devices by not sharing them," he warned.

The display of graphics images will also continue to improve this year, if 1984 was any indication. The past year saw the popular use of high-resolution bit-mapped displays, as in Apple's Macintosh and IBM's recently announced Personal Computer Professional Graphics Display, reportedly capable of displaying 256 colors simultaneously, and Professional Graphics Controller. The display and controller were designed to be used together and are targeted at the CAD market, IBM said.

While new printers and displays may be popular, Paller said that user interfaces such as the mouse are "yesterday's news" and few advances can be expected soon. Klein agreed, claiming that interfaces "are not going to make or break the technologies," though voice input may soon become popular.

One interface on the personal computer that is catching on for CAD graphics users is the graphics palette, a pressure-sensitive device that can translate drawings done on it into images on the screen.

Such an interface is already common on mini-based CAD systems and, according to the marketing manager for one palette vendor, is the most natural one for draftsmen making the move to the CAD method of drawing. Such workers, according to Andy Nilssen of Pencept, Inc., are more comfortable working with pad and pencil than they are with keyboards.

Pencept of Waltham, Mass., produces the Penpad 320 graphics tablet for the IBM Personal Computer. Recently, the firm introduced a version of Penpad 320 with an interface to the Autodesk, Inc. Autocad package, the personal computer CAD package said to be most widely used. Called Pencad, the package includes a Personal Computer interface board, software and Penpad 320.

Related to the touch-sensitive pad is the image sensor, a relatively new CAD input device that can be moved over a three-dimensional scale model of a product to capture its shape and design.

Another type of peripheral making its mark on the graphics scene is the image processor, such as the Wang Laboratories, Inc. Professional Image Computer (PIC), which uses a camera lens on a lighted stand to scan and digitize a picture for storage, manipulation and even transmission. Other devices, such as the AT&T Video Display Adapter and Image Capture Board, rely on video cameras to capture images.

The AT&T products, both an-

See HARDWARE SR/5

Special Report

Carl Machover: An Interview

Computer graphics, an area rich with opportunities, is a very familiar field to Carl Machover. He has been involved in the computer graphics industry for more than 25 years.

Machover began his career in computer graphics in the 1950s with United Technology Corp. and Sklatron Electronics and Television Corp. In 1960, he became cofounder and executive vice-president for Information Displays, Inc., an early pioneer in the computer graphics market. In 1976, Machover formed Machover Associates Corp., a consulting firm specializing in computer graphics.

He is also an author, speaker and adjunct professor of computer graphics at Rensselaer Polytechnic Institute.

In a recent interview with Computerworld *Special Reports Editor Janet Fiderio, Machover discussed computer graphics, an industry that is rapidly changing.*

Cover photo by J. Pelaia

Q *A lot has happened at the microcomputer level in graphics over the past year. What developments can we look forward to in '85 and '86?*

If we use the past as an example, and look at today's market pressures, we will see increased function in the workstation itself.

I expect to see greater function in microcomputer hardware additions of one kind or another, not in software. There will be increased pressure to refine the picture quality or the resolution of microcomputer displays.

For example, early micros had a 125- by 125-pixel resolution, while some of the more recent units are in the 300- by 400-pixel range.

Currently, there is a graphics board available for the IBM Personal Computer AT that provides a 480- by 640-pixel resolution. I would guess that in about a year we will begin to see personal computers with a 1,024- by 1,280-pixel resolution.

Also, the amount of internal storage memory will increase. Today a microcomputer with 512K bytes is not unusual; a couple of years from now a microcomputer with 4M to 5M bytes may be the norm.

My guess is that you'll see a very low-price scientific market (a graphics scientific market) emerging that makes use of these new micros. I think that the de facto standard will evolve around the AT.

Q *What about graphics software? What will be some of the better microcomputer developments in this area?*

Computer-aided design. The whole series of CAD systems that are being introduced are worth watching. Autodesk, Inc.'s Autocad, for example, sold almost as many CAD systems based on the microcomputer as the conventional CAD industry has sold in systems since 1969.

There are some interesting statistics involved here. By the end of '84, it was estimated that there were about 15,800 to 16,000 conventional CAD systems installed. This represents about 65,000 workstations: conventional Computervision Corp., Applicon and IBM (machines). That is in a period from, say, 1970 to 1984.

In the two years since we have had microcomputer CAD, the microcomputer CAD industry has delivered 15,000 systems, about 10,000 of which were delivered by Autocad. That is one workstation per system, so the number of workstations is down and the dollar value represented here is down, but the body count is phenomenal.

These systems will become more functional and refined; they will also become more specialized. Most of the microcomputer CAD-based systems today are sort of generalized drawing systems.

Q *So microcomputer CAD systems are moving into the vertical markets?*

Yes. What is happening is that they are moving into a second-level market in which vendors are adding refinements for given application areas; I think that this trend will accelerate.

The problem with second-level or vertical markets is that there is no distribution channel for them. Once you use a microcomputer and go into a vertical market, and you are selling systems in the $10,000 to $15,000 range, how do you sell them? The normal levels of support are simply not available.

There has been a real problem establishing communications and distribution channels for these levels, and I think once those channels get well established, this market will explode even more than we see it today.

Q *How does this growth in the personal computer computer-aided design and manufacturing market affect the mini and mainframe CAD/CAM market?*

I think it has scared . . . the conventional market.

Large companies are beginning to recognize that they are going to have to put some strategy in place to account for the personal computer's increasingly sophisticated presence in the market.

I think over the next few years what you'll find is that most of the major companies will have some level of personal computer offering. It is not clear how it is going to go.

Q *Where do you think the market separation will fall?*

I think to survive, larger companies will expand the product that they offer. I don't see a mainframe- or minicomputer-based system surviving without offering some link on the manufacturing side and offering more integrated systems. I think the ones that are not integrated are going to migrate down to the microcomputer level.

After all, more sophisticated users are recognizing that the big payoffs come from the integration of engineering and drafting and computer-aided engineering, drafting and CAD/CAM. It is unlikely that they can build an effective system based on microcomputers for that environment because they can't get enough performance out of them. What they will need is a mixed environment of mainframes, minis and personal computers but operating on a project rather than a task basis.

New users will tend to migrate to the low-cost workstations and the microcomputer. Larger companies will use micros as part of their strategy but will continue to have essentially closed shops. For drafting functions, the high-speed functions of a turnkey system are very important. The numerical control aspects in some cases require many resources.

When a user moves into very sophisticated analysis, such as circuit analysis, he probably doesn't have enough power in a microcomputer for the process, or it would just take too long.

Q *Presentation graphics are in the news a lot lately. Do you think that executives are really more attuned to the benefits of presentation graphics, or do you think it's hype?*

It is a little bit of both. I think that classically, the business person, as opposed to the scientific person, does not have a background in graphics — most of his professional training is in numbers, not in graphs.

Many, however, are recognizing that they are being deluged with so much data that they have no choice but to find a way of being more efficient in the use of that data. They have to find a way of turning data into usable information.

Certainly one of the tools for doing that is graphics of one kind or another. So there are a large number of business people who are recognizing that the only way that they can survive is through the use of these graphics systems. Others still have a degree of skepticism, but this issue has gone on for years.

There certainly is an amount of hype — trying to get people to do this — but the bottom line is that increasingly they are. The business graphics market is growing faster than the CAD/CAM market.

Q *Do you think that recent advances of low-cost laser printers and advanced pen plotters, ink-jet printers and color thermal transfer printers will help boost corporate use of the microcomputer?*

Yes. Probably the one that will be most instrumental in doing that will be the laser printer. For a printer to meet corporate applications, it must have high resolution, be very fast and be relatively inexpensive. The thermal dye transfer of the pen plotters and the ink jets are still technologies that are too time-consuming.

The present limitation on laser devices is that they do not have the color technology. I sense that there will be color lasers on the market economically priced within the next couple of years. We are already beginning to get rumors about it, and I think that once those become available the logjam argument for not using the graphics because "I can't get enough output copy in color" is going to be broken.

Q *Right now the military dominates the simulations sales market. Do you see simulations sales for commercial use growing?*

Yes I do, although it's a cost-sensitive market. A good high-performance simulator in today's market costs $5 million just for the display generator portion.

Airlines can purchase simulators because a training session in a simulator costs around $400 an hour, whereas a training session in a real airplane can cost $4,000 an hour. But if I am going to simulate people driving down the road, as in a driving school lesson, the economics just aren't there at that price. There are many simulation markets that will open up as the cost of simulation goes down.

I think there are two conflicting trends in the simulations market. There's the true computer graphics kind of simulation, and there is the growing use of interactive videodisks.

I think there is going to be a real race between the simulation growing out of videodisk technology and the simulation growing out of computer graphics technology. I think what will happen is that you will get distinct classes of simulators and some of them are going to be based on videodisk technology and others are going to be based on computer graphics technology.

Q *Will artificial intelligence play a role in tomorrow's graphics systems?*

Yes, if you define AI as a generalized machine for thinking as people think. At this point, AI probably is still too academic to be used in the graphics area, but a subset of the field — knowledge-based systems or expert systems — are extremely important for graphics.

I would guess that it will take three to five years before dramatic products in this field arrive, but certainly it is an area that has to be watched carefully.

Special Report

Executive support systems put corporate data base

By Alan Paller
Special to CW

The use of support systems in executive suites is on the rise throughout the U.S. Today, executive support systems can, with the push of a single button, deliver information rapidly, accurately and in graphics formats that communicate trends and patterns.

Nicknamed "graphics visual early warning systems," these new tools revitalize the relationship between top management and DP departments. They put the resources of corporate data bases at the fingertips of the people who need that data to manage the organization. They deliver the data in graphics format, usually in less than 10 seconds. And when an executive sees information that needs to be communicated to other people, he can, with the push of a button, automatically produce 35mm slides, overhead transparencies or paper charts.

> *In commercial organizations, MIS executives recognize that today's fast-paced, competitive markets make it necessary to have the best information available immediately.*

At General Motors Corp. (GM) headquarters in New York, executives consider their graphics executive support system so important that they will not discuss it publicly. At a GM subsidiary, Electronic Data Systems Corp. (EDS), an executive support system helps senior management monitor the performance and finances of all regional data centers.

According to one EDS executive, the graphics system made buying a mainframe unnecessary and helped to cut overhead cost growth significantly.

GM is not the only organization to discover graphics executive support systems. The U.S. Army Aviation Systems Command pioneered an online system for its senior officers that includes 1,400 charts, which are automatically updated each time the data changes. Each chart is available at the touch of a button. The Air Force's Electronic Systems Division is prototyping a similar system.

Other organizations, both large and small, are considering extending similar capabilities to senior managers. Their goals are the same — they want to make the computer a vital tool for top management.

In commercial organizations, MIS executives recognize that today's fast-paced, competitive markets make it necessary to have the best information available immediately. That is the justification for Sears Roebuck & Co.'s Easy Access System, which provides instant access to the previous day's operating results from more than 95% of its retail stores.

Improvements involve top management

In government agencies, MIS executives recognize that productivity improvements will not happen without the involvement of top management. That involvement is made easier when management has fingertip access to the data that measures productivity.

What has surprised a number of MIS managers is how quickly demand for these systems can spread among top management.

That raises the next question. If executives are excited about these new push-button systems, why has it taken so long for the idea to catch on? Four barriers made these systems impractical in prior years:

- The data was not there. Either it was not on the computer, or it was there and only the experts knew how to get at it. Retrieval systems required extensive training, and executives did not have the time to learn the systems.
- Equipment was expensive and communications were slow. Graphics terminals used to cost $20,000 or more. Also, communications lines were too narrow to pass pictures quickly. No one wanted to spend a lot of money, only to have to wait a minute or longer just to see the picture.
- Graphics hard-copy equipment demanded too much effort. Once a chart was created on the screen, there was no easy way to make a high-resolution 35mm slide, an overhead transparency or a paper chart automatically. The terminal or personal computer user had to be an expert plotter operator, keep his own pens and paper and even learn the switch settings. Most executives know their time is too limited for them to become machine operators.
- The personal computer arrived without connections to the data. Outfitted with Lotus Development

Paller is president of AUI Data Graphics, a consulting firm in Washington, D.C., and chairman of training and education for the National Computer Graphics Association.

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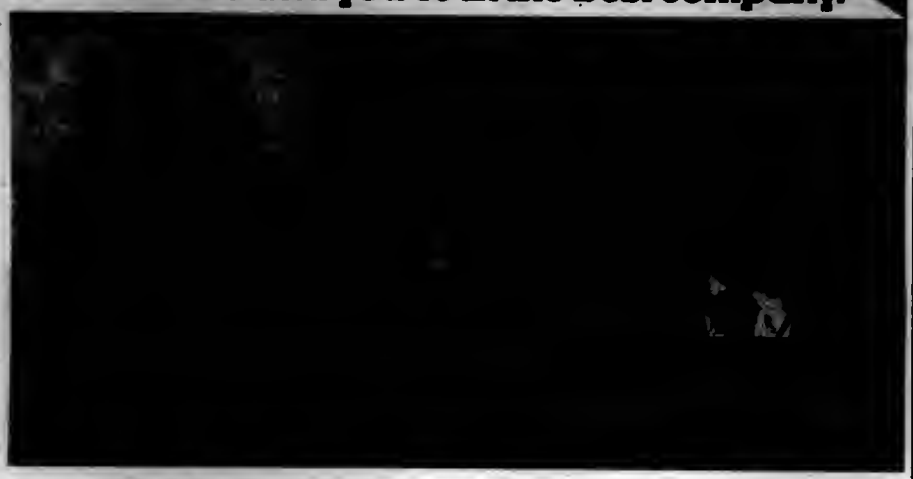

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Special Report

at top managers' fingertips with touch of a button

Corp.'s 1-2-3, the personal computer promised easy executive computing, but the novelty soon wore off for senior managers.

The cost of graphics terminals has dropped below $5,000. New graphics hard-copy equipment has been introduced that operates automatically and can be shared by dozens of users.

The pioneers who built their own systems spent one to two man-years creating the software and three to six months putting together the right data and the right charts to solve the business problems. All of them felt the investment was worthwhile, but they would have preferred an off-the-shelf solution.

Late in 1984, a combination of new announcements in the graphics software and hardware fields made off-the-shelf graphic visual early warning systems for IBM computers available for the first time.

The principal components are listed below:

■ IBM's Graphics Data Display Manager software provided support for instant access to graphics images. It also provides a mechanism for transferring graphs from SAS Institute, Inc.'s SAS/Graph and IBM's Interactive Charting Utility into Isseo Graphics' Tell-A-Graf, which is the method of choice for supporting the new graphics devices listed below.

■ Isseo's Ivias option to Tell-A-Graf provides a system that stores and retrieves charts instantly, manages the automatic updating of libraries of charts and provides push-button access to graphics devices for production of 35mm slides, transparencies and paper charts.

■ New graphics devices provide shared access to higher quality output. Output from these devices is available at the touch of a button.

Some of the new graphics peripherals include the following:

■ Matrix Instrument's QCR film recorder makes artist-quality slides but acts as a printer to an IBM computer. The price is less than $40,000 for a single device that can serve hundreds of users.

■ Quality Micro Systems, Inc. laser printers make publication-quality black-and-white charts at a rate of two to eight per minute at a cost of less than $15,000. It can be shared among dozens of people and serves as a standard printer when not being used for graphics.

■ IBM's updated 3800 laser printer brings high-priced but very high-speed black-and-white graphics to every user of the IBM mainframe computer.

■ Tektronix, Inc.'s and Advanced Color Technology, Inc.'s new ink-jet printers make full-color charts on paper or transparencies and run without operators for extended periods.

■ Nicolet Zeta Corp.'s 887 plotter offers continuous plotting without operator intervention and can emulate IBM printers.

Evidence of extraordinary demand for graphic early warning systems can be found in the number of organizations that decided to acquire the new Ivias software before the end of 1984.

Sixty- different organizations, ranging from aerospace and pharmaceutical firms to banks, oil companies and government agencies, spent an average of $20,000 each to give their users immediate access. The number of organizations is expected to rise by 400% during 1985, as top managers discover that executives of other companies in their industries have, at the push of a button, instant access to the data they need to stay competitive.

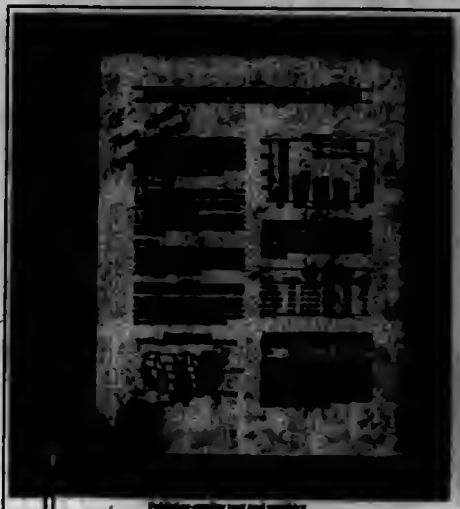
HARDWARE from SR/2

nounced early last year, are said to permit three-dimensional pictures to be captured and displayed — albeit two-dimensionally — and to be sent over telephone lines to other users. AT&T said that the products and related software would permit a realtor, for example, to transmit pictures and prices to prospective buyers.

The Wang PIC, according to its marketing manager Len McCarthy, has found a broad range of applications, including its use by a bank to replace telex and optical character recognition transmissions. Early this month, Wang introduced a package for CAD, using the PIC, that included Autocad2 along with a black-and-white thermal transfer printer, a 30M-byte storage unit, a high-resolution monitor and a Wang Professional Computer, the unit upon which the PIC is based.

Taking a futuristic view, Machover said that five to 10 years from now the big development in graphics will occur in the mainframe environment, with the rise of parallel processing. Parallel processing, now in only limited use, would allow for the creation of richly detailed scenes that could be changed in seconds.

This all goes to show that while the personal computer may now be in vogue for graphics use, the day of minicomputer and mainframe graphics is far from over. As Machover said, the increasing use of the personal computer for graphics "does not mean that we won't need larger resources. For every problem that we start migrating down to the personal computer, we can think of a whole new series of new problems that we had no way of attacking before."



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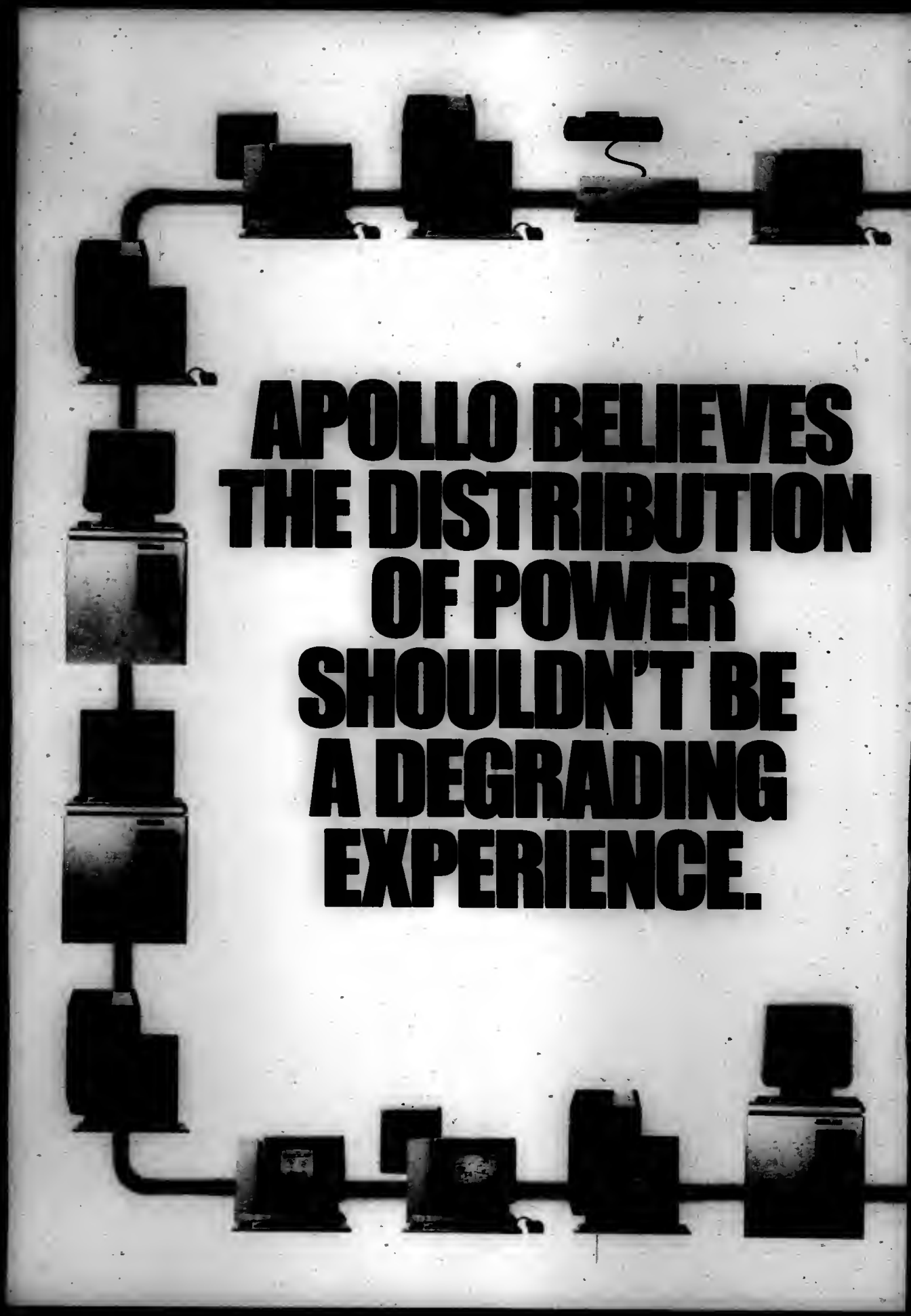
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Special Report

Visual aids enhance value of appraisal firm's reports

Automated graphics process improves turnaround time, quality of designs

HOUSTON — A commercial real estate appraisal firm here is using computer-generated graphics to buttress hardbound reports that it creates for clients who want to know the current and future value of investments they are planning to make.

Robert B. Jones & Co. appraises office buildings, golf courses, malls, horse ranches and other large commercial properties. Its clients — the Federal Deposit Insurance Corp., Chase Manhattan Bank, Gulf Oil Corp. and others — pay the firm between $5,000 and $200,000 for its services.

When clients ask Robert B. Jones to appraise a building they are thinking of buying, the firm studies the building's income history, the demographics of the neighborhood where the building is located and the amount of money a similar building would cost to construct at current market rates. The company then compiles the information into reports that comprise hundreds of pages.

With the reports, Robert B. Jones aims to answer the question that lies in the back of a buyer's mind. Jim McGrath, systems manager at the firm, said that question is: "If I spend a dollar today, what's it going to be worth 10 years from now?"

Charts and graphs allow the reports to draw this bottom line so that clients can see it clearly. With graphics, McGrath said, "You can take three pages of confusion [and] make it into a chart, and a kid can pick it up and understand it."

Until recently, designers in Robert B. Jones' graphics department manually produced charts and graphs for the reports. Their turnaround time was slow — a designer, for example, typically needed at least two hours to determine how to partition a pie chart, draw the chart and color it in — and the results were relatively crude. "We weren't doing anything fancy," McGrath said.

Last year, the firm began a search for software to automate the task. Robert B. Jones had installed a 4Mbyte Digital Equipment Corp. VAX-11/750, so the search centered on software for that machine. The software had to meet two operating criteria: it had to be easy for designers to use and had to offer them flexibility in their work.

■ **Ease of use.** The use of automation, in general, had just begun at Robert B. Jones, and some users had yet to log on to a terminal. One of the benefits the firm hoped to reap from graphics was an understanding and acceptance of computer tools.

■ **Flexibility.** Because graphics output would be used to supplement the different categories of research the firm included in its reports, the software had to produce a variety of charts and graphs.

McGrath said the firm eliminated most of the 14 software packages it investigated because they fell far short of the ease-of-use requirement. With them, he said, "you pretty much had to be a programmer . . . to generate simple charts."

In July 1984, Robert B. Jones purchased Exhibit, a graphics package from Information Processing Techniques Corp. (IPT). The firm served as a beta test site for the VAX version of the software, which IPT had until then offered only for Data General Corp. machines.

After two months of testing and reworking the software, Robert B. Jones brought it up in production mode. Graphics designers have cut their average chart turnaround time to about 15 minutes, McGrath said.

The designers work on DEC VT241 color and VT240 monochrome graphics terminals. They call up preformatted charts and plug in values that the firm's real estate appraisers have uncovered in their research for a specific client. After entering the information, the designers output the chart on an eight-pen Zeta Research, Inc. plotter. Graphics designers can also use Exhibit to call Ascii text files from various data bases and format them for plotting.

The automated graphics process is easier than the old manual method, McGrath said. Because the charts are already formatted, the designers no longer need to plan each one individually, he said.

The increase in productivity has allowed the firm to expand its valuations department from eight to 15 certified real estate appraisers without adding any new members to its four-man graphics department.

The graphics department has used the software to create bar charts that show market absorption (how quickly office space gets leased once it is available) in a specific area and plots that show building vacancies over time for a given area (Figure 1), along with other functions.

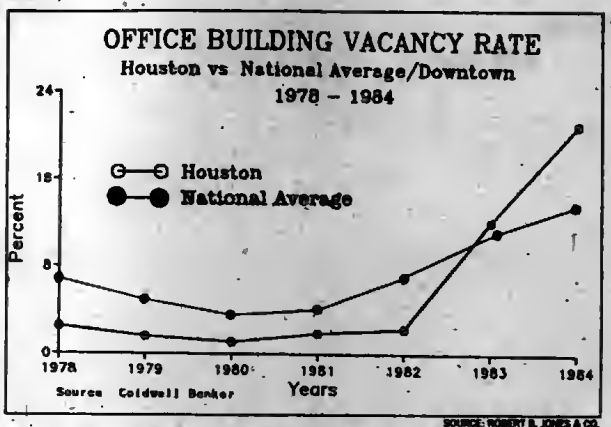
Such neighborhood demographics point out trends that influence the value of commercial real estate. Houston, for example, currently has a glut of office vacancies, McGrath said, and building owners are "doing everything shy of giving office space away."

Robert B. Jones' employees use the graphics they produce to help their clients grasp the complex market trends that underlie appraisals. "It makes [market influences] much easier to understand for people who would not normally understand what you're talking about," McGrath said.

The firm also uses computer-generated graphics to help its executives analyze in-house performance. In one application, two bar charts — one showing fee-income goals, the other depicting actual daily income — are printed side by side so the company's managers can see if production is on schedule.

If employees meet the company's goals, they earn quarterly bonuses. When Robert B. Jones began producing the fee-income bar charts, its executives noticed that fees generally trickled in during the beginning of any given month, picked up and then slacked off in the middle of the month and soared at month's end. The firm's employees had made the push at month's end in order to meet goals and win bonuses, McGrath said.

During their month's end rush, the employees put in overtime hours, for which the firm had to pay premium wages. When the charts alerted executives to the trend, the managers took steps to level off fee income throughout the month in order to halt the month-end rush and bring down the amount of money they paid out in overtime wages.



SOURCE: ROBERT B. JONES & CO.

Figure 1. Vacancy charts are one form of graphics the firm produces.

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>
> — Jim McGrath
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Special Report

Ansi standards draw attention of graphics industry

By David M. Shuey
Special to CW

Standards are increasingly a concern in today's computer graphics industry. In the U.S., graphics standards are developed under the auspices of the American National Standards Institute (Ansi) committee X3H3. The committee, which consists of nearly 70 voting companies, works in conjunction with the International Standards Organization (ISO).

Recent X3H3 committee efforts have focused on the following graphics standards:

■ **The Graphical Kernel System** (GKS) provides a two-dimensional graphics interface for applications development. It is intended to provide a device-independent kernel system. As such, it does not provide extensive graphics formatting capabilities such as axis generation, pie chart utilities and shaded characters.

These capabilities were omitted from GKS to shorten the development process and make the standard more manageable when implemented and certified; their omission will also make training more manageable in the user community.

In addition, the ISO sponsored an effort in the past year to extend GKS to a three-dimensional system. The emphasis here was to provide 3-D graphics description and viewing capabilities while retaining the form and behavior of the existing two-dimensional GKS standard.

> *The Computer Graphics Metafile was designed to provide a picture transfer mechanism for graphics systems.*

The viewing model, previously developed for the Programmer's Hierarchical Interactive Graphics Standard (Phigs), was provided as input and influenced the current form of 3-D GKS. The ISO approval of 3-D GKS is expected by this summer.

■ **Phigs** is being developed by the X3H31 committee as a graphics interface for applications development. It is not intended to replace GKS but rather to provide a graphics standard for applications whose needs are not met by GKS or its extensions.

Some of these needs are the display and manipulation of geometrically related objects; the rapid motion of parts of an image, within the constraints of the graphics device performance; and the need for increased flexibility in the modification of picture components.

Areas where the use of Phigs is appropriate include computer-aided design and manufacturing (CAD/CAM), computer-aided engineering (CAE), process control, molecular modeling and page layout applications.

The concept of the hierarchical graphics data structure is central to Phigs and allows the applications programmer to describe picture components, such as a standard part or the description of multiple views of an object, and use it repeatedly in the final image without respecification.

Phigs incorporates modeling transformations to relate spatially the various parts of the hierarchy. This capability is familiar to applications that deal in the spatial relationships between objects. Flexible display modification capabilities enhance the hierarchy's utility.

Phigs seeks to provide a small number of modification commands that allow unconstrained modification of all parts of the stored hierarchical data. This simplifies making applications changes to the display, including changes Phigs designers did not foresee.

> *Graphics packages that use the Computer Graphics Interface can easily integrate new hardware into the system.*

■ **The Computer Graphics Metafile** was designed to provide a picture transfer mechanism for graphics systems. A metafile need not be produced by a device-independent graphics system such as Phigs or GKS. It was designed to be independent of the graphics system that produced it.

The picture the metafile describes can be drawn in two ways. An applications program can read the metafile and then use a graphics system to draw the picture. Alternatively, an application can be written that reads the metafile and uses device driver routines to draw the picture in a manner similar to a plot spooler.

The graphics metafile was designed for picture exchange, not for the exchange of geometric data. The National Bureau of Standards' Initial Graphics Exchange Specification (Iges) standard has been developed for the transfer of both geometric and nongeometric product definition data between CAD/CAM systems. The graphics metafile and Iges are intended for different purposes and use different levels of representation for their data.

■ **The Computer Graphics Interface** (CGI) was designed to serve the needs of hardware and software vendors. Graphics packages that use the CGI can easily integrate new hardware into the system, especially if the hardware has been developed using the CGI.

The CGI was designed to serve a wide range of graphics packages and devices. It must be simple enough to support basic graphics devices and packages and functional enough to support more sophisticated graphics devices and packages.

The CGI divides each major functional area into a basic set of functions and several optional sets of functions called "option sets." To conform to the standard, a basic set of capabilities must be present. Each option set is divided into required and nonrequired functions.

A CGI-conforming interface must support the basic set of functions for a device class, plus the required set of functions in any option set supported. Inquiry functions are provided to identify supported option sets and nonrequired functions that may be supported.

■ **Language bindings.** Phigs and GKS are functional standards. To use a standard in applications development, the programmer needs a standard interface between the functions of the standard and the selected programming language. This standard syntax definition is called "language binding." Bindings to most graphics programming languages are being developed for GKS and will be added as separate sections to Part 2 of the Ansi GKS standard. These language bindings define the calling sequences for the GKS functions and the mapping of GKS data types to the available types of the language.

The Fortran binding to GKS is complete and will be published with the Ansi GKS document. Other bindings in development are to Pascal, Ada and C. Preliminary work has been done on binding to PL/I and Cobol. In addition, the design of a generic language binding is being considered. This binding would be effective in multilanguage applications environments.

Documentation on the X3H3 committee projects described above is available from the X3H3 Secretariat, Computer and Business Equipment Manufacturers Association, Suite 500, 311 First St. N.W., Washington, D.C. 20001.

Shuey is a section manager for McDonnell Douglas Information Systems Products Co., a supplier of information products.

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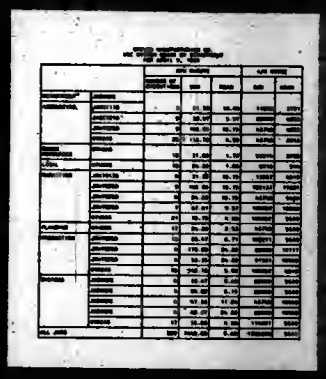

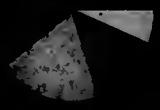

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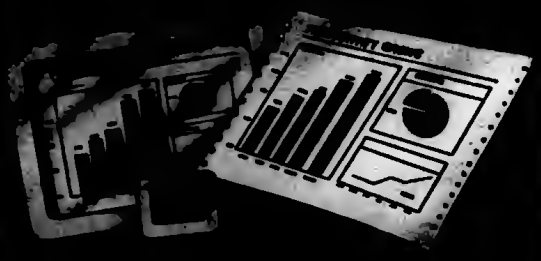


Special Report

Cadd solves engineering firm's production woes

After long-term corporate growth creates array of project coordination and drafting challenges

By Phil Anzel
Special to CW‡

LARAMIE, Wyo. — Computer-aided drafting and design (Cadd) has helped an engineering consulting firm here draw the line on a series of chronic production problems.

At Banner Associates, Inc., a firm that provides civil, mechanical, electrical and architectural design and project management for clients like the U.S. Army Corps of Engineers, corporate growth over a number of years had heaped weighty demands on production draftsmen and brought on a series of problems.

Growth led to work on larger, more complicated jobs; average project budgets grew from $5 million to $15 million. The increased complexity required more individuals to work on drawings than had in the past, and engineering coordination became a problem. On one reservoir project, a group of draftsmen layed out a road in the same place another group had already planned to put a spillway; the road design returned to the drawing board.

In addition, drawing quality varied from one draftsman to the next. As many as 10 draftsmen's work went into any given project, and inconsistency of style reduced the overall quality of work going out the door.

Moreover, — there was no direct connection between computer-aided engineering — carried out by some homegrown programs running on a 2M-byte Digital Equipment Corp. VAX 11/780 superminicomputer — and manual drafting activities. The firm's computer staff suggested Cadd to solve these problems.

The staff's early efforts, used to whet the corporate appetite for Cadd, consisted of making low-resolution graphics upgrades to a DEC LA 120 printer and two VT100 CRT terminals. Selanar Corp. graphics boards fitted to the three machines allowed for graphics representation of some data from the engineering programs. The boards allowed draftsmen to use the programs to create, view and print x/y plots, contour maps and some cross-section drawings.

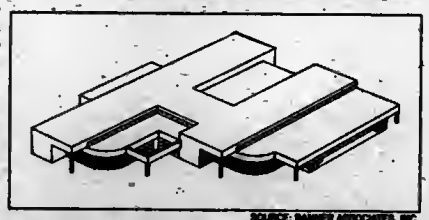
Within several months, the graphics capability — used by about eight of the firm's 15 draftsmen — was considered indispensable to Banner's operations. Success created a corporate environment of reception toward Cadd, so Banner's computer staff launched a search for a more comprehensive system.

Systems the firm examined fell into four categories:

- Subroutine libraries that did not include any type of user interface.
- Stand-alone systems.
- Multiuser software/hardware systems.
- "Open" systems — those that provided both open loops for custom programming and off-the-shelf software for immediate use — that would run on Banner's VAX.

The firm discarded subroutine libraries — their prices were attractive, but they would give the firm nothing to show initially for its investment. Banner estimated that it would need between six months and a year to compile a drafting front end for the subroutines. Such a delay far outweighed any economic advantage.

The stand-alone systems were eliminated because of the technical burden of coordinating multiple users performing many simultaneous projects on loosely coupled machines. Networking schemes that were available at the time to connect stand-alone workstations and VAX machines fell short of the company's standards. In addition, the small systems were not cost-effective in quantity, and most had difficult user interfaces.



SOURCE: BANNER ASSOCIATES, INC.

Top view of library designed by Banner

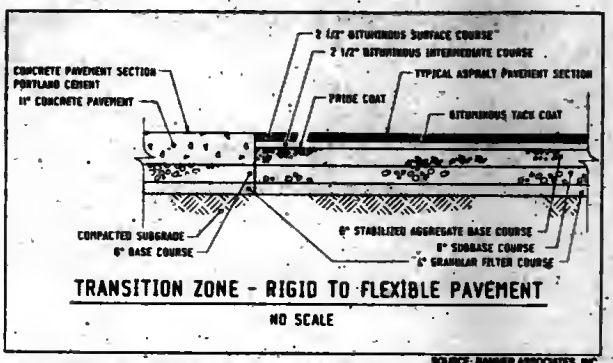
Passing up multiuser hardware/software systems was difficult because these systems provided all the functions the firm desired. Banner finally rejected this option, however, because it had made a sizable investment in its VAX and did not want to add extra processors that would duplicate its existing hardware.

With the search narrowed down to open systems, Banner drew up a set of requirements against which it weighed different vendors' products. Any system that the company purchased would have to include the following:

- Two-dimensional Cadd capabilities. Because the primary task of the system was replacement of manual drafting, this capability was crucial.
- A command-driven setup. Banner had considered menu-driven systems and rejected them. While menus were easy for the novice user, the way they operated — requiring users to switch from menu to menu for different tasks — would cripple production draftsmen's speed. Banner wanted to use keyboards as its primary input path for new data and digitizers for inputting existing drawings.
- Three-dimensional capability for future projects. The firm desired solids modeling but considered a wire-frame capability adequate for the tasks that were likely targets for automation.

Anzel is manager of computer services at Banner Associates, Inc., an engineering consulting firm in Laramie, Wyo.

Special Report



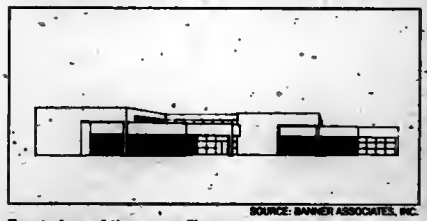
SOURCE: BANNER ASSOCIATES, INC.

Graphics representation of a road cross-section

■ An interactive interface between the Cadd system and Banner's homegrown engineering software. The firm decided that future development with Cadd would require tight links between applications programs and graphics. Most Cadd packages offered a file interchange facility, but the firm needed more than that.

Cost was also a factor, as was the standing of the Cadd vendor itself. Banner had to weigh not only the initial system price, but also the incremental cost of adding new workstations.

Banner wanted a vendor that was firmly established and had a reliable product but was small enough so that Banner could have input into the ongoing development of the Cadd system.



SOURCE: BANNER ASSOCIATES, INC.

Front view of the same library

The firm selected Palette from Palette Systems, Inc. and installed the vendor's software on its VAX in April 1984. Along with the software, Banner installed eight Tektronix, Inc. 4105, 4109 and 4115 terminals, a variety of digitizers and ink-jet printers and a Hewlett-Packard Co. 7586B plotter.

Productivity matched in a month

Training proceeded rapidly: In less than one month, terminal users matched their manual productivity; once the draftsmen were comfortable with the machines, most could handle double their former work load. Some operators have tripled their output.

Banner's computer staff let individual engineering department managers decide whether to use Cadd, and the managers' initial reactions ranged from affection to aversion. The only drafting group in the company to come on-line at first was one in the electrical/mechanical design department.

Since then, acceptance of the Cadd system has become universal at Banner, with the structural, civil and architectural design departments using Cadd capabilities. Most of the firm's draftsmen use the system in any given month.

Completed design drawings that took an average of 40 man-hours to produce manually now take an average of 20 man-hours. It is no longer cost-effective for the firm's draftsmen to do new drawing projects by hand.

Department coordination improved

Coordination among departments has improved significantly because the system has overlay capabilities that allow one group's design to be placed over others on a terminal screen. Draftsmen can see during the initial phases of a project whether designs conflict (whether, for example, electrical draftsmen have planned for a wire drop where no structural conduit exists); they can then fix problems before they have devoted a lot of work to a project.

In addition, the Cadd software provides a standard letter set so drawings are more uniform than they were before.

Standard symbols that Banner has programmed into software libraries allow draftsmen to use greater detail than they previously did.

When they worked manually, draftsmen could not include on their drawings symbols for lighting fixtures, for example, because drawing the symbols over and over consumed too much time. Both lettering and drawing are of a higher quality than they were when draftsmen did them by hand.

These capabilities have given Banner a competitive edge in both the production and presentation stages of its projects. The system has helped convince customers to award the firm complex design jobs.

The Cadd vendor has been receptive to suggestions about system enhancements. Palette, for example, has begun to offer small and large digitizers — products for which Banner had expressed a need — in addition to its medium-size line.

Banner is currently installing a leased line and multiplexers to support additional workstations and another plotter at a satellite office in Brookings, S.D. It has also begun to look at ways to increase the cycle capacity of its VAX processor. Since the firm brought up its Cadd system, it has upgraded the VAX to 6M bytes, but engineering, design and administrative applications are using all of the newly available capacity. This problem is a healthy one, an indicator of the success of the firm's venture into Cadd.

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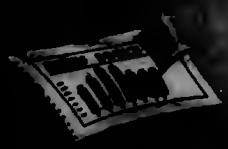
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Special Report

Three-dimensional viewing pays off in productivity

Interpreting complex models simplified

By Richard M. Fichera
Special to CW‡

The use of three-dimensional graphics technology in any application requiring the visualization or manipulation of complex geometries is almost guaranteed to pay off in user productivity.

When local interactivity is added to adequate three-dimensional renderings, the traditional model of interaction between user and computer is changed. Typically, graphics are used for the previewing and postprocess viewing of data. It is now possible for end users to manipulate complex three-dimensional objects interactively.

Because of an earlier lack of high-quality interactive graphics, engineers and other technical professionals developed conventions for working with ambiguous line drawings and have codified them as elaborate drafting standards.

Many problems that engineers encounter involve the interpretation of what are essentially multidimensional mathematical functions. These can be visualized clearly and rapidly when they are presented graphically.

Figure 1. An object composed using a wire-frame renderer.

Figure 2. A Gouraud shaded, depth-buffered rendering of Figure 1.

Another area where three-dimensional graphics is helping to define new interactive techniques is the geophysical industry. Geophysicists interpreting three-dimensional seismic data can work much faster when they can interactively walk through their data looking for oil-bearing features.

The development of high-quality rendering techniques has been one of the hottest research and development areas in graphics. The simulation of all of the subtle cues that the human visual system uses to deduce the three-dimensional nature of real-world objects is not trivial but involves substantial fundamental research to establish the basic models.

The basic model for a renderer is the scene, which has the following basic parts:

- Object geometry.
- View geometry.
- Lighting models.

Object geometry is the model of the object that is to be rendered and defined in some arbitrary coordinate space. View geometry is the relationship of the viewer's eyepoint to the object geometry. This has implications for such effects as perspective and decides which portions of the object will be visible.

The lighting model is the interaction of the available sources of light, the surface characteristics of the object geometry and the view geometry. The model can be extremely complex, with multiple light sources of varying colors, varying base colors of the object geometry and other surface properties such as a specular or shiny reflection.

The rendering task can be seen as composed of two subtasks — visible surface processing and color and shading processing. These operations are often linked, as in "hidden surface removal and shading," but they are actually separate processes.

Visible surface processing is the correct display of only those portions of an object visible from a given eyepoint. Color and shading processing is the calculation of the correct color for each visible pixel on the display. This is where the complexities of the light model come into play. The actual calculations used to determine the color of each pixel can be very time-consuming, and much of the work involved in developing an effective renderer is often focused on finding shorthand ways to do those calculations.

See MODEL SR/22

Fichera is director of marketing at Raster Technologies, Inc., a components manufacturer in North Billerica, Mass.

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Special Report

Microcomputer graphics show high sales potential

By Oliver L. Picher
Special to CW3

The rest of the computer industry may have seen a period of sluggish sales and general disinterest, but the microcomputer graphics market is still growing at a respectable pace — that is, if the number of new programs available is any indication.

A survey of microcomputer graphics programs conducted by Datapro Research Corp. in February revealed an abundance of graphics-related programs on the market. The number of programs identified increased 33% over a previous survey conducted last August. Although some areas of the graphics market showed signs of a shakeout, much of the program increase can be attributed to new offerings from new entrants in the market.

> ***Because so many computers lack sophisticated graphics support, the potential market for microcomputer graphics programs is enormous.***

The market for microcomputer graphics programs is a relatively immature one. Although more graphics programs are probably available than any other type for a microcomputer (spreadsheets, word processors and others), the installed base of these programs is a good deal smaller than that of programs in other categories.

Best-selling graphics programs, for example, generally have an installed base ranging from 10,000 to 50,000 copies, as compared with 500,000 to 750,000 copies for the best-selling spreadsheet programs.

Because so many computers lack sophisticated graphics support, the potential market for microcomputer graphics programs is enormous. This market consists of utility programs, specialty graphics programs and business graphics programs.

■ Utility programs are the oldest and most competitive segment of the market. The programs are generally graphics tools that might enable users to combine quality graphics with their Basic or Pascal programs or might allow images displayed on screen to be sent to a dot matrix printer or might provide support for such graphics devices as light pens or digitizing boards. These programs are common, very inexpensive and often produced by smaller software houses.

■ Specialty graphics programs have seen the greatest growth in the past year. The number of personal computer-based computer-aided design and manufacturing programs, for example, has increased dramatically and will probably continue to increase for some time. These personal computer CAD/CAM packages can be used to turn an ordinary personal computer into a high-quality computerized drafting and design system; the programs are generally expensive, but they are still less expensive than a dedicated CAD/CAM system.

The past year has seen the introduction of several other types of specialty graphics programs. One of the most unusual categories is mapping software. There are now several packages that can be used in either cartography or in demographic planning, and others are sure to follow. Project management and statistical analysis are two other growing areas. Although neither is a purely graphics-based application, the use of graphics makes the results produced by these programs that much easier to understand.

Another potential high-growth area is in computerized typesetting and page layout. These programs have been available for a number of years, especially as dedicated systems, but Apple Computer, Inc.'s introduction of the Macintosh and the new generation of inexpensive laser printers seem to have given this market area a shot in the arm. The availability of these programs, along with inexpensive hardware, could create a tremendous boom in small, in-house publishing operations.

■ Business graphics programs, which generally create bar and pie charts, are still doing well according to the Datapro survey. These programs fall into two more categories: analytical graphics and presentation graphics.

Although the two types of business graphics programs use the same sort of charts, the purpose of the charts is different for each category.

Analytical graphics programs are meant to be used as decision-support tools; users would take data from another source and then use the graphics to help pinpoint the major trends occurring in the data.

Presentation graphics programs

Picher is associate editor/analyst at Datapro Research Corp. in Delran, N.J.

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Special Report

in sluggish marketplace

are used as communications tools; the program may show the exact same data used in an analytical chart and even may use the same format, but a variety of other highlighting features, such as the use of color, special text styles and background shading, would be used to emphasize the message of the chart.

The shakeout

If a shakeout is occurring among graphics programs, it is among analytical graphics programs. Because access to data is an essential characteristic of this sort of program, there has been a dramatic shift away from stand-alone, analytical graphics programs toward integrated programs. Lotus Development Corp.'s 1-2-3, which combines a spreadsheet program with built-in graphics functions, was only the start of this trend.

The number of integrated programs, where graphics is only a part of a complete application program, has increased faster than the number of stand-alone business graphics programs.

However, the introduction of such integrated programs as 1-2-3 has probably expanded the graphics market overall. More than 500,000 copies of 1-2-3 have been sold. Almost any survey of personal computer users will place Lotus' 1-2-3 as the best business graphics program available, which makes it clear that many people are getting their first exposure to computer graphics through 1-2-3.

> *If a shakeout is occurring among graphics programs, it is among analytical graphics programs.*

Many of the successful stand-alone presentation graphics programs have capitalized on the success of 1-2-3 by taking the charts produced by 1-2-3 and enhancing them with the use of color, special text styles and even freehand images.

The success of a presentation graphics program depends on the high quality of the graphics, especially in the output. Data transfer is also important, but not as essential. Judging from vendor response to Datapro's survey, the competition in the presentation graphics area is also getting quite fierce.

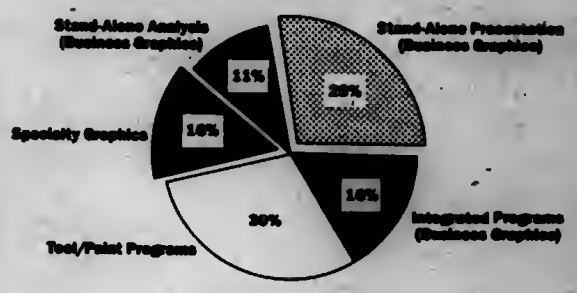
The most common new feature offered was support of the Polaroid Corp. Pallette, or some similar slide-making system. Several other vendors had just introduced programs that produced text slides for use on an overhead projector; these programs were meant to be used as companion pieces to the vendors' other business graphics programs.

Although the market may be tight and the vendor competition increasing, it is clear that the micro graphics market is still going strong. There will probably always be a need for small utility graphics programs, although they will never be the most glamorous part of the market.

In terms of business graphics, the market for analytical graphics programs is now the domain of the integrated productivity program. However, because of the limitations of computer size, disk storage and just plain processing speed, a market for stand-alone presentation programs with more flexibility and better quality than the integrated programs will continue.

The competition between presentation graphics programs so far has been healthy. The number of features has grown and the graphics quality has improved immensely during the last two years, and users will probably continue to see an improvement.

Types of Graphics Programs
February 1985 Datapro Research Corp. Survey



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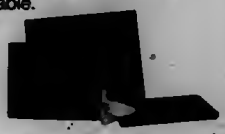

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Special Report

Established corporations move into graphics market

By Stanley Klein
Special to CW

Despite its growth and all the hullabaloo surrounding it, computer graphics still remains a niche market, accounting for no more than 10% of total computer revenue. Because of this, computer graphics has largely been an entrepreneurial field — pioneered by start-up companies.

Product lines by the start-up companies have encompassed hardware, software, systems and services — indeed, the gamut of computer graphics. But hardware innovation is losing ground as an entrepreneurial opportunity.

Established corporate giants, such as IBM, 3M Corp. and Eastman Kodak Co., are beginning to move into the computer graphics hardware field in earnest. Start-up firms, in turn, are moving into graphics software.

The history of the graphics marketplace provides some perspective on the current trends. Over time, computer graphics has become an adjunct to the traditional computer field, especially at the low end, where graphics applications — bar code printing, forms creation and elementary line-graph drawing — tend to be simplistic.

Computer graphics, however, remains distinguishable as a distinct field at the high end; for example, in computer-aided design and manufacturing, image processing, film animation, simulation and modeling applications.

Here, the minimum resolution requirement is 512 by 512 pixels, and 1K- by 1K-pixel resolution is preferred. Available palettes offer hundreds of color choices with shading simultaneously on the screen, and fancy manipulations occur in three dimensions. Computational and display speeds provide for smooth movements of objects, with response times measured in microseconds.

The wide variety of peripherals for high-quality presentation output — those machines designed to produce overhead transparencies, slides and the like — also distinguishes the business graphics field from traditional computer applications.

High-end applications, then, have spawned products apart from those used in traditional DP, and a distinct market and supplier population has grown up around them. The supplier population is composed mostly of start-ups, as the corporate birth dates of the 550 graphics firms listed in the 1985 "S. Klein Directory of Computer Graphics Suppliers" makes clear. Of the 550 firms, 392 have been formed since 1970.

The 1985 edition of the directory contains four times as many vendors as appeared in the first edition, published in 1980. Corporate proliferation during this five-year period has been fueled by an abundance of venture capital. The surge can be dated specifically to 1978, when IBM dropped memory prices by 40%, thereby rendering computer graphics technology economically viable almost overnight.

The number of start-up computer graphics companies has almost doubled during each five-year period in the past two decades (Figure 1). The years 1981 and 1982 were peak periods — more than 60 computer graphics companies were launched during each of the two years.

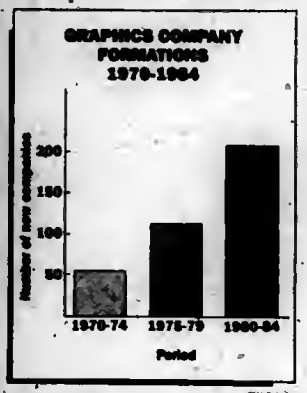

Figure 1. The number of new companies has doubled every five years.

Recently, established companies have entered the market. Foremost among these, of course, is IBM. Big Blue started its major move with a color graphics workstation it introduced less than two years ago. IBM significantly enhanced the workstation this fall, when it also made major board-level and software improvements to its Personal Computer product line in terms of graphics capabilities.

For its move into presentation graphics, 3M started up a 35mm slide-making service a few months ago. The company has since moved into art and design applications by acquiring exclusive marketing rights to a turnkey paint system made by Artronics, Inc.

See NICHE SR/25

Klein is editor of "The S. Klein Newsletter on Computer Graphics." Klein's Sudbury, Mass.-based firm, Technology & Business Communications, Inc., publishes the newsletter and companion directories of graphics suppliers.

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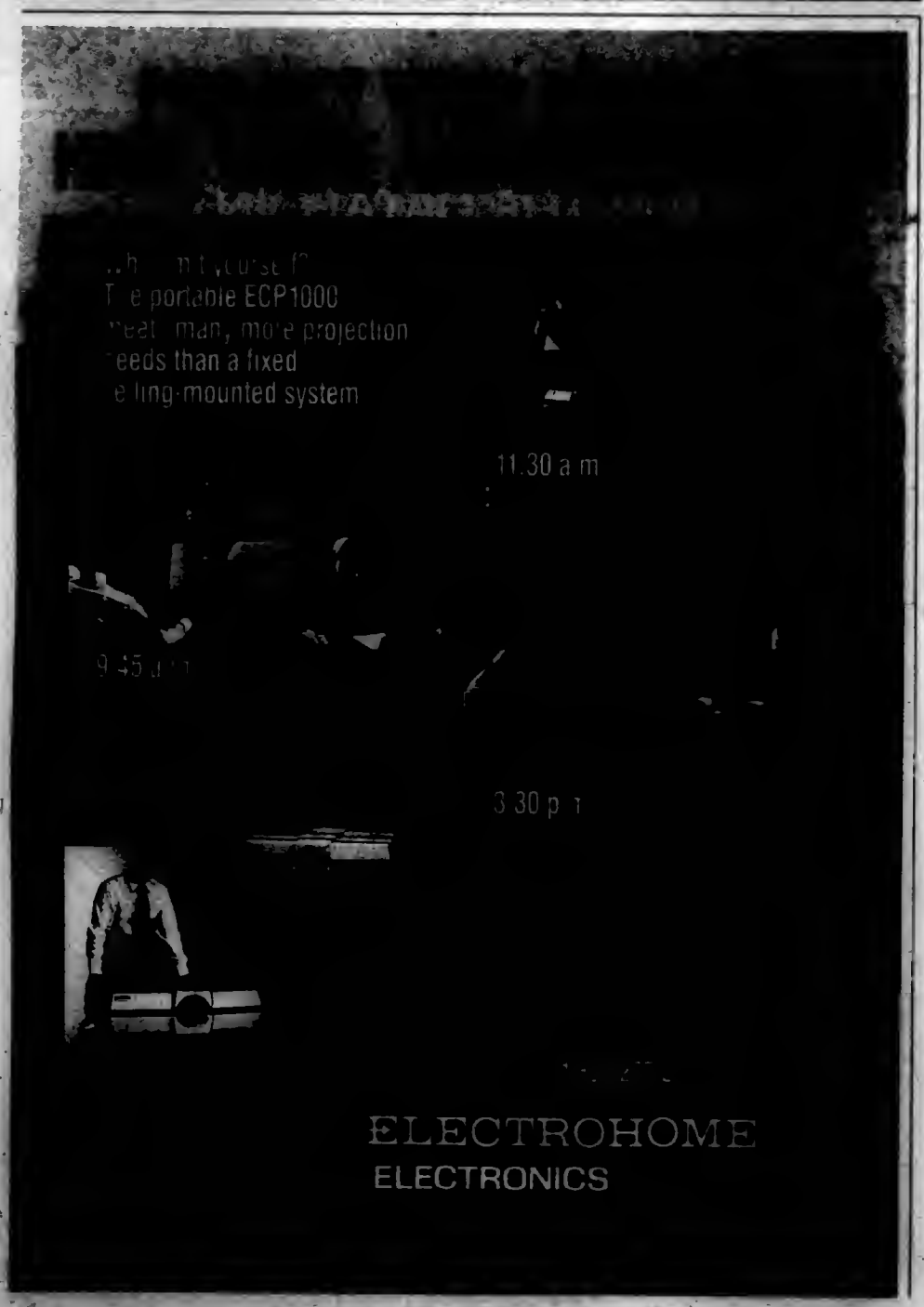
Special Report



MODEL from SR/16

There are currently three renderers in commercial use — wire frame, depth buffer and ray tracer.

The wire-frame renderer is the most basic. It was implemented for use with direct-view storage tubes and vector refresh systems. This renderer, while fast, shows only the edges of the object (Figure 1, page SR/16). A look at the image will highlight some of its disadvantages — detail can be cluttered, and it is hard to differentiate a surface from a hole.

The depth-buffer renderer goes a step further and provides an effective way both to resolve the geometric ambiguity present in a wire-frame rendering and provide for easy integration of techniques to improve visual realism. A depth-buffer renderer uses, in addition to the displayed image raster, a duplicate image memory, which stores physical depth information for each pixel. If the existing value indicates that the new pixel is in back of the existing pixel, it is not written. With the declining costs of memory, this has become a practical method for low-cost graphics systems.

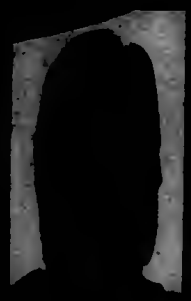
Techniques for implementing some of the "shorthand" shading calculations can be added to the depth buffer. These techniques are used to estimate shading and color values between exact points, typically at the vertices of patches. The two common shading methods are Gouraud (Figure 2, page SR/16) and Phong, named after their originators.

Ray tracing

Ray tracing is the rendering technique that gives the most realistic results. It works by mathematically tracing a ray from the viewer's eyepoint through each visible pixel on the screen and checking for intersections with each possible object in the data base. If an intersection is detected, a check is then made to determine whether the ray ends there or if a reflected or refracted subray should be generated.

This process is very time-consuming, with typical ray-traced images taking from six to 12 hours on a Digital Equipment Corp. VAX-11/780 class minicomputer. It does, however, yield a variety of visual effects, including reflections, transparency with refraction and soft shadows, that cannot be easily obtained with other renderers.

The use of three-dimensional graphics as a natural user interface is a compelling answer to many of the user interface issues that have plagued system designers since the first automated system.



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Special Report

Graphics use takes off with firm's top managers

Aerospace company's system gives execs easy access, computer literacy

LOS ANGELES — Graphics use has broken the top-management barrier at an aerospace firm here.

In the engineering department of Northrop Corp.'s aircraft division, a vice-president and five senior managers have menu-driven access, through IBM 3279 Model 3 color graphics terminals and homegrown software, to any of 241 charts that present key project, budget and manpower data. Northrop plans and builds sophisticated fighter aircraft such as the F-20 Tigershark and the F/A-18 Hornet.

The setup that provides top managers with graphics data about design projects, the Executive Management Information Network (Emin), evolved from a project that put decision support and graphics software in the hands of lower level personnel in the engineering department. That project, the Information Service Center (ISC), began in 1983. Today, the center serves about 450 users.

NORTHROP

When graphics use proved to be popular with engineering personnel, systems analysts in the ISC decided to try and take the concept to the top. According to analyst Jon Rockeman, the step seemed only natural: "With all these people producing charts, we wondered, 'Why can't managers view them?' "

The ISC staff decided that management could use the graphics but only if the system of accessing them met some broad criteria. "Managers at that level don't know what they want," Rockeman said, "but they definitely know what they don't want."

Generally, top managers at Northrop did not want to spend much time either learning to access or actually accessing graphics information. So, above all, the Emin system had to be easy to use. Analysts designed the system so that managers could call up any desired chart through a series of menus.

With the first menu, the manager selects the category of chart (manpower or budget, for example) that he wants to view. A menu appears on the manager's screen that shows a list of chart names within the chosen category.

The list includes only charts that have been recently updated, deleted or added. These are in chronological order — the chart that has been changed most recently appears at the top of the list — and cover two weeks of activity.

To call up a chart, a manager types an "S" next to the name of the chart and presses the Enter key on his keyboard. The chart appears on his terminal screen. If he wants to view charts in sequential order, backward in time from the most recently updated one, the manager need only continue to press his Enter key. The response time between request and display ranges from five to 10 seconds.

Each chart file displays the date on which the file was last updated. Charts also include the names and phone numbers of the lower level managers who created them. If an executive needs more information about a topic, he can get it easily.

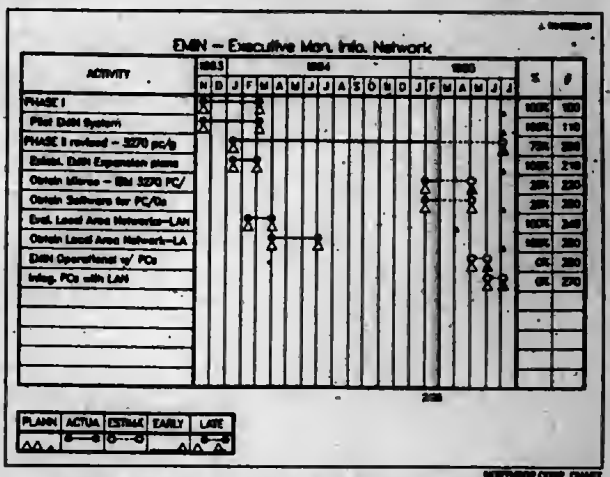
The information the charts contain is of a strategic nature, culled from operational information at lower management levels. Lower level managers prepare the charts using various software packages running on a 16M-byte IBM 3033, mainly Isoco Graphics Software's Tell-A-Graf and Tell-A-Plan and IBM's ADRS II/BG and GDDM.

Emin also provides top managers with tabular data, which they can combine into pie charts through interactive sessions with the mainframe.

These sessions do some harm to response times, Rockeman explained, but no more than one manager at a time generally uses them, so the problem is not a major one.

The Emin project is still in its pilot stage, but it has been reviewed for possible use by other managers in the aircraft division and by personnel at other Northrop facilities.

Within the engineering department of the aircraft division "the response to Emin has been very positive," Rockeman said. "We have top-level executives who want timely, high-quality information. I think everyone realizes the productivity gains."



NORTHROP CORP. CHART

An example of the kind of charts to which Northrop executives have access.

Computer literacy for management

He said that the system's benefits are hard to quantify, but that one positive result of Emin is that it gives top managers some computer literacy. If managers are comfortable with the technology, he reasoned, they will be more amenable to bringing office automation into their departments.

A recent event just may bear him out: One of the managers who initially seemed disinclined toward Emin recently ordered $300,000 worth of personal computers for his staff.

Rockeman said the move was, at best, an indirect result of the Emin program. But the ISC staff hopes the trickle-down effect of office automation will stand as a further justification for introducing executives to computers.

NICHE from SR/20

Continental Can Co. recently created a graphics services unit to automate artwork preparation and production in consumer packaging applications. Its service is built around Scitex's Response 350 computer graphics publishing system.

Also moving in for the kill in computer graphics is Eastman Kodak. Last fall, Kodak introduced an instant slide-making film intended to compete against a similar Polaroid Corp. product. It also invested $20 million to acquire a 7% ownership in Sun Microsystems, Inc., a manufacturer of graphics workstations. Other established companies in the photography market have recently made entries into computer graphics.

These stirrings may signify the end of the era in which start-ups dominated graphics hardware innovation. With established companies entering the hardware market, younger firms are moving toward software. For example, Casa/Gifts, Inc., which was established in 1984, offers finite element software for use in mechanical engineering.

Entrepreneurs are also creating graphics software to run on micros. One example is Foresight Resources Corp., established in 1980 and reorganized last year. The firm designed a two-dimensional computer-aided design package for the IBM Personal Computer featuring a human interface much like the one Apple Computer, Inc. uses on its Macintosh.

The next few years promise to bring more of the same. An outpouring of personal computer graphics software will be one of the next entrepreneurial waves.

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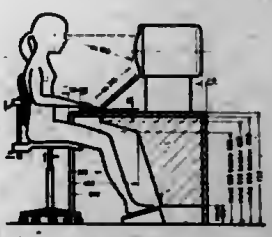

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KOFFLER

Special Report

Tools cut lab's development time

BETHPAGE, N.Y. — Programmers in Grumman Data Systems Corp.'s graphics development laboratory here have decreased their development time by as much as 50% with a tools package that allows them to write programs for a variety of output devices without making modifications to accommodate each machine's capabilities.

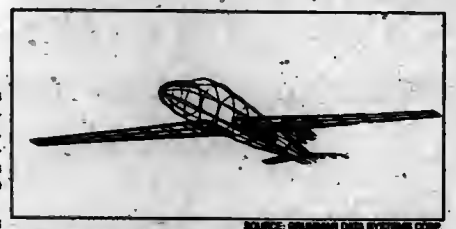
The lab develops programs, particularly computer-aided design and manufacturing (CAD/CAM) applications, for different groups within Grumman Corp., Grumman Data Systems' parent firm.

Its projects include three-dimensional modeling, real-time simulation of aircraft guidance and control and the verification of cutting paths for computer-controlled milling machines.

The broad scope of the applications requires an equally broad assortment of output devices — color raster terminals, hybrid storage tube/refresh terminals, highly intelligent 3-D vector refresh displays and several drafting plotters. It uses terminals from Tektronix, Inc., Ramtek Corp., Raster Technologies, Inc. and IBM, and plotters from Tektronix, Versatec, Inc. and Comp/80.

The graphics software the lab uses to service the different machines is DI-3000, a device-independent tools package from Precision Visuals, Inc. The package includes subroutines for 2-D and 3-D transformations, graphics primitives (rectangles and sectors, for example), multiple text fonts and polygon fills.

According to Michael Holtzman, a senior programmer/analyst and head of the graphics lab staff, the software allows programmers "to develop applications on one device and transport them to others throughout the company, regardless of model or manufacturer."



SOURCE: GRUMMAN DATA SYSTEMS CORP.

A 3-D drawing produced by Grumman's CAD/CAM tools.

Grumman has installed two copies of the package: one on the corporation's 32M-byte IBM 3081 mainframe and the other on a 4M-byte Digital Equipment Corp. VAX-11/780 in the graphics development lab.

Programmers can call any of 160 subroutines that are included in the package through a host Fortran program. The subroutines accept parameters from the programmers and produce images for an idealized virtual graphics device that incorporates the attributes of most common physical devices.

Software device drivers then convert the images into device-dependent instructions, which can be understood by the device in use and can take advantage of as many hardware features as that device provides. Grumman uses some device drivers that it purchased from Precision Visuals and others that its programmers developed themselves.

For an application called Aptdraw, a CAM utility the graphics lab created for Grumman Aerospace's Corp.'s Machining Technical Services group, programmers used DI-3000 for development work that they performed on a full-color raster device. The application, however, normally runs on monochrome terminals and single-pen plotters.

The device-independence of the program lets the machining group reserve its expensive color workstations for applications that absolutely need color, Holtzman said.

In another application, the development of a mathematical curve that allows users to manipulate free-form surfaces interactively, programmer Julius Kim said the tools package cut his development time in half. It allowed him to specify a mathematical model for a single virtual device instead of considering the hardware capabilities of several physical devices.

Kim said he also relied on the package's ability to transform 2-D and 3-D images from its own coordinate system to a virtual device coordinate system. The package performs the transformation after programmers specify the eight corner coordinates of the display windows and viewports they want to use.

Besides saving the graphics lab time and allowing users to take advantage of devices best suited to their needs, the tools package helps the lab with its future acquisitions. It uses the package in its continual evaluations of new equipment, such as high-capacity vector refresh terminals and high-speed communications devices, according to Holtzman. "DI-3000 allows us to accommodate equipment upgrades without major reprogramming," he said.

The lab is currently working on programs that allow users to access drawings generated from CAD/CAM systems for use as illustrations in technical manuals and other publications.

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MICROCOMPUTERS

Future business micro to offer 1M byte of RAM, 32-bit CPU

By Edward Warner
CW Staff

Ask the soothsayers of the computer industry what the corporate personal computer will look like in 1990 and nearly all describe a machine with at least 1M byte of internal memory, several hundred megabytes of storage and a 32-bit microprocessor — all beneath a blue and white IBM logo.

In addition, they say the soul of that new machine — its operating system — will likely support multitasking and a windowed operating environment such as IBM's Topview, Digital Research, Inc.'s Graphics Environment Manager or Microsoft Corp.'s Windows.

Beyond these similarities, however, the personal computers of these visionaries' dreams differ. Equally strong differences also arise among corporate microcomputer managers, some of whom wonder if all that added power is really needed.

"A lot of that stuff scares the hell out of me," said Neil Cookrish, in-house microcomputer consultant at Bankers Trust Co. in N.Y. "A lot of people are using personal computers for things they shouldn't be using [personal computers] for." If the machines get much more powerful, he said, users "are going to get lost."

"If you need [5M bytes] of memory," he observed, "maybe you should be on a mainframe."

Aaron Goldberg, an analyst with International Data Corp. (IDC), a Framingham, Mass.-based market research firm, disagreed. "Put yourself in the place of someone in 1983 saying [to himself] 'I've got 10M bytes of storage, who could ask for more?' " he suggested. Most corporate users have already used up the maximum storage of their 10M-byte hard disks, he claimed, and are now crying for more powerful machines.

Such machines are nearly on the horizon, he observed. Within five years, he said, users will find themselves confronting a personal computer with a 200M-byte internal hard disk, diskette drives storing from 2M bytes to 5M bytes and a 32-bit

See FUTURE page 58

Seattle bank buying 1,000 Macintoshes

By Kathleen Sullivan
CW West Coast Bureau

SEATTLE, Wash. — Seattle First National Bank recently announced it has agreed to buy 1,000 Apple Computer, Inc. Macintosh microcomputers that will be used in its corporate headquarters and offices here and distributed throughout the state at its more than 150 branch offices.

Lou Mertes, executive vice-president of Seattle First National's operations group, said the bank plans to install approximately 250 Macintoshes during each quarter over the next year. He said the machines will be used by the "entire gamut" of Seattle First National personnel, including secretaries, professionals, managers, customer service representatives and the sales and marketing staff.

The Macintoshes will handle word processing, spreadsheets, graphics and elec-

See SEATTLE page 56

■ Compass Systems introduced a 'classified' version of its Grid portable computer with embedded encryption capabilities/84

■ Intel announced Open Net, a local-area network connecting dissimilar microcomputers running under several operating systems/88

INSIDE

Software/84
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Vendors search for next big win

SMALL TALK
Eric Bender
CW Senior Editor

It's 1987 and you're a Manhattan executive. Business is temporarily slow and you're bored with your job. You come in and boot the personal computer, read your electronic mail off the local-area network, look at images of product advertisements (sent from your company's San Francisco office for your neighbor to review), voice-annotate a memo, check the new expert system that replaced half your staff, log on to Dow Jones & Co., call your stockbroker and electronically place a sell order, play Space Flight Simulator, surreptitiously read through your boss' files, graph the Northeast monthly sales report six or seven ways, try to crash Lotus Development Corp.'s Symphony 3.0, and there goes the morning.

Each year there are more choices of pleasant and mildly useful things to do with an office microcomputer, but which new programs are genuinely needed by the multitudes?

You know the ones — the next major packages, the "whole new category" applications that will leverage micros for all those hours when no one's even playing Flight Simulator.

Software vendors are forever waiting

See CHOICE page 57

PC-DOS version of SAS System makes its debut

CARY, N.C. — SAS Institute, Inc. has introduced a version of the SAS System that runs under IBM's PC-DOS on the Personal Computer AT, Personal Computer XT and compatible machines.

Scheduled for availability in the third quarter of 1985, the integrated software reportedly provides tools for data management and retrieval, statistical analysis, report writing, graphics and applications development.

SAS Institute emphasized that the new software is compatible with its counterparts on mainframes and minicomputers. "The SAS language, syntax and commands

See SAS page 58

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Local Area Networks For Large Organizations

NESTAR

Grid micro touts government-certified encryption

By Mitch Betts
CW Washington Bureau

McLEAN, Va. — Grid Systems Corp. last week added to its Compass line of portable computers a new model that provides embedded encryption features.

The Model 1117 is certified by the U.S. government to provide secure communications up to the confidential level of classified information.

The product, which will be marketed to military, intelligence and other government agencies and contractors, adds high-grade communications security features to the Model 1107, which has government-approved Tempest shielding that prevents leakage of electromagnetic impulses, a Grid official said.

The Model 1117 is the first product to be certified by the National Security Agency (NSA) for communications security under the NSA's new Commercial Comsec Endorsement Program, according to an NSA official.

The product reportedly permits secure point-to-point communications, including conversational text and file transfer, as well as secure point-to-host communications. It is certified for the communication of messages up to the confidential level of security but not for secret or top secret levels, the vendor said.

Like the Model 1107, the Model 1117 has 512K bytes of random-access memory and a 6-in. diagonal amber display and weighs 15 lbs, including modem. It supports Grid peripherals, software and terminal emulators.

The price for the Model 1117 is $12,995, or $1,000 for an upgrade of the 1107.

Grid's federal sales office is located at 7923 Jones Branch Drive, McLean, Va. 22102.

SOFTWARE

■ C. S. Laboratories has introduced Version 2.5 of its C/Script II applications development system for the Ryan-McFarland Corp. Version 2 Cobol compiler. The product is available for IBM Personal Computers and compatibles and Microsoft Corp. MS-DOS or AT&T Unix-based machines supporting Ryan-McFarland Version 2 runtime.

C/Script II automates RM-Cobol applications development, allowing users to specify data, screen descriptions and program-specific information, a spokesman said.

RM-Cobol reportedly allows an unlimited amount of user code to be entered. Source code programs are generated through the use of skeleton files, a data dictionary and three source code generators.

C/Script II for a single user costs $1,950.

C. S. Laboratories, 459 Dean Road, Auburn, Ala. 36830.

■ Modular Software has announced Modular Bridge, which reportedly allows IBM Personal Computer users to transfer files between the Pick Systems PC-XT operating system and other operating systems.

The product reportedly allows the user to write PC-DOS or MS-DOS files onto Pick T-Dump format diskettes. It requires a Personal Computer or compatible with PC-DOS or MS-DOS 2.0 or 3.0 and two double-sided diskette drives or one diskette drive and a hard disk.

Modular Bridge costs $100.

Modular Software, P.O. Box 204, Union City, Ga. 30291.

Index, Inc. has announced Structured Architect, software that reportedly combines analysis, graphics and documentation capabilities into an integrated environment for IBM Personal Computer users.

The product runs on the IBM Personal Computer, the Personal Computer XT, the 3270 Personal Computer and the Personal Computer AT

Continued on page 57

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Intel announces Open Net for linking dissimilar micros

By Matthew Sullivan
CW West Coast Bureau

SANTA CLARA, Calif. — Intel Corp. recently introduced Open Net, a local-area network said to allow dissimilar microcomputers and operating systems to be connected on a network.

At present, Open Net will enable communication among systems using Microsoft Corp.'s Xenix, IBM's PC-DOS and Intel's RMX operating systems, the company said.

Intel announced four Open Net products, including two printed-circuit boards that reportedly connect microcomputers to Ethernet local-area networks and to RMX and Xenix networking software packages, which allow concurrent file sharing among RMX- and Xenix-based systems.

Transparent file access

Open Net's networking software provides transparent remote file access, which permits users to manipulate files from remote locations as if the file resided on a local node, the company said.

In a related development, Ungermann-Bass, Inc. of Santa Clara, Calif., announced two network controller boards that will allow IBM Personal Computers and some IBM-compatible systems to communicate with products in Intel's Open Net family.

The boards use Ungermann-Bass's Personal Connection network controllers to run software jointly designed by the two firms.

Intel also joined forces with Microsoft to ensure that Open Net would be compatible with that firm's Microsoft Networks local-area network software. Microsoft Networks is said to allow network file access among personal computers that run Microsoft's MS-DOS operating system.

Additionally, Open Net's network protocols are fully compatible with IBM's PC Network, an Intel spokesman said.

Provides alternative

The spokesman added that Open Net provides an alternative in a market that is "fragmented" by networks based on a variety of proprietary protocols.

Open Net is based on protocols developed by the International Standards Organization (ISO) and is said to consist of hardware and software products that cover all seven layers of the ISO network model.

Intel said Open Net's open architecture provides a set of "building blocks" for network integrators, OEMs and end users.

On-board memory

Intel said its ISBC 552 and ISXM 552 circuit boards feature on-board memory and are based on Intel's 80186 microprocessor, 82586 local-area network coprocessor and 82501 Ethernet serial interface chip. The ISBC 552 is the "unbundled" version of the board; OEMs can download network programs into the board's random-access memory for custom applications.

The ISBC 552 and ISXM 552 boards will cost $1,500 and $1,900, respectively. The RMX and Xenix networking software will be available for OEM licensing for $9,500 each.

Intel is located at at 3065 Bowers Ave., Santa Clara, Calif. 95051.

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MICROCOMPUTERS

Continued from page 54

with 256K-byte memory and the IBM Color Graphics Adapter. It can also be used with Compaq Computer Corp.'s Portable, Plus P or Deskpro computers.

Structured Architect costs $5,000 for the first unit and $2,250 per additional unit.

Iadta, P.O. Box 4179, 325 E. Eisenhower Pkwy., Ann Arbor, Mich. 48106.

■ Advanced Microsolutions (AMS) has introduced a Basic language translator designed to help convert Hewlett-Packard Co. Series 80 Basic programs to the HP Series 200 Basic versions 2.1 and later.

The AMS Series 80 to Series 200 Translator can translate 90% of all Series 80 Basic language keywords, including read-only memories and binaries, according to the vendor. Translated data files will retain their original random or serial structure.

The product is priced at $695.

Advanced Microsolutions, Suite 207, 110 Alma St., Menlo Park, Calif. 94025.

■ Advanced Market Technologies has announced the availability of its portfolio management applications software for Digital Equipment Corp.'s Professional 300 series of microcomputers.

The Portfis Investment Management System gives users capabilities for tracking, maintaining and evaluating multiple client portfolios, a spokesman said. The product incorporates menu-driven commands and on-line help facilities.

Reportedly, the Portfis Investment Management System provides automated valuation of portfolios and provides an optional generation of daily transaction reports. Each portfolio can contain up to 84 stocks, bonds and options, for a total of 256 investment listings.

Portfis Investment Management is priced at $495.

Advanced Market Technologies, 831 Grandon Ave., Columbus, Ohio. 43209.

COMMUNICATIONS

■ Telenetics Corp. has announced Expressdata 121, a 1.2K bit/sec modem that runs on the IBM Personal Computer.

The asynchronous, full-duplex modem is stored on an expansion card that fits inside the micro. It features autoanswer and autodial features and is compatible with Hayes Microcomputer Products, Inc.'s command protocol, the vendor said.

The modem includes an adaptive equalization feature that adjusts communications to various telephone line conditions and helps to ensure error-free transmission.

The product is bundled with VM Computing, Inc.'s Relay communications software that supports micro-to-mainframe communications, includes password and encryption features and emulates IBM 3270 series terminals. The software compresses data so that file transfers work at a speed of 1.6K bit/sec.

The modem costs $495.

Telenetics, 895 E. Yorba Linda Blvd., Placentia, Calif. 92670.

CHOICE from page 53

through *Computerworld*'s office, with jazzy new offerings in presentation graphics, image manipulation, voice communications, icon-based networks, decision support packages, desktop organizers or project management.

The concepts usually sound good and useful — at least to some people, some of the time.

Take project management — William Lohse, president of Breakthrough Software in Novato, Calif., suggested that two generations of software from now, more people will be managing projects than doing spreadsheets on micros. Who can say he's wrong?

But even if that potential exists, it will take a long time to convince those throngs of users. And customers now seem more interested in refinements to currently popular software packages.

"We're in a less exciting mode," commented Richard Rabins, president of Alpha Software, Inc. in Burlington, Mass. Many packages sound as if people should want to buy them, but "it's not necessarily the sexiest and most innovative products that succeed," he said.

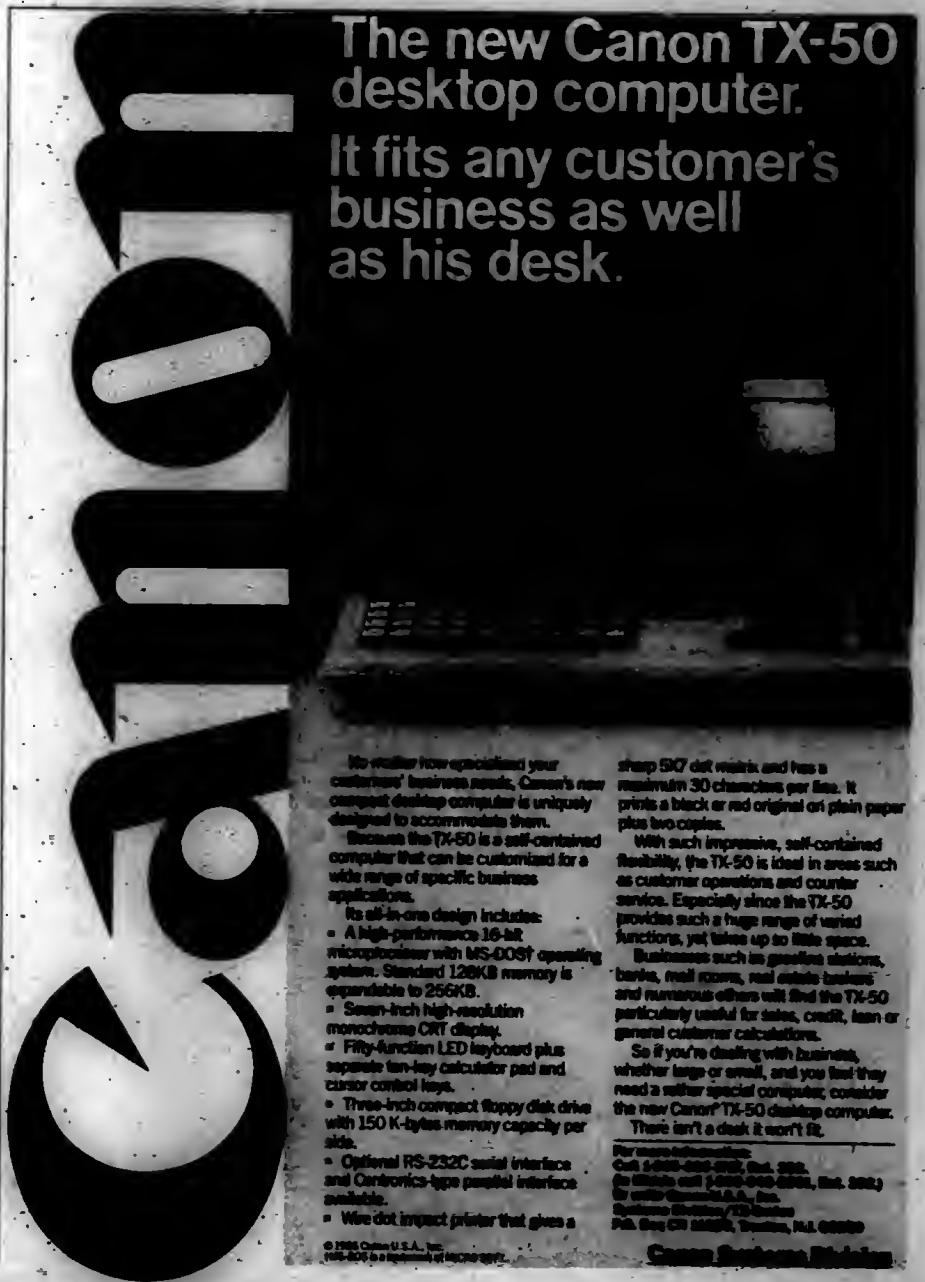
And the genuinely useful aspects of the hot packages are often mundane. For example, some outline processors originally designed as brainstorming tools may end up simply managing details.

Management Science America, Inc. (MSA) next month will introduce another product family that will do something even less exciting — emulate mainframe data entry terminals at remote sites.

But the packages probably will do quite well among MSA's customer base, because they offer a chance to cut communications costs and mainframe processing loads.

These roads to success, though, are too slow for the many micro software vendors who need a big hit. Very few are making any real profits. "There's only one company out there that's constantly doing well, and that's [Lotus Development Corp.]," Rabins said.

"The only companies making money in software are a handful that have the standard," said Lohse, whose company, like Sorcim/IUS and others, hopes to create a standard in project management packages. He acknowledged that the goal represents "a small eye of a needle, and it's shrinking."



FUTURE from page 53

CPU addressing 1M byte of random-access memory (RAM) and 2M bytes of virtual disk memory.

Signs of the movement toward 32-bit microprocessors are already visible, with AT&T, Motorola, Inc. and National Semiconductor Corp. all shipping such devices. Intel Corp. plans to begin deliveries of its 32-bit 80386 chip to systems developers this summer.

Another industry observer surpassed Goldberg in his expectations for the personal computer of the 1990s. Al Hirsch, editor of the newsletter "Datapro Reports on Microcomputers," published by Datapro Research Corp., a Delran, N.J.-based market research firm, predicted that 16M bytes of RAM — the maximum storage addressable by the 32-bit chip — will become the standard. For storage, he added, users can expect to see 500M-byte units based on magnetic media technology.

Hirsch also speculated that 64-bit microprocessors might come into use on personal computers by the end of the decade.

Raymond Falls, an associate editor of Datapro's newsletter, also predicted increases in the data storage standard — and decreases in diskette sizes. No longer will the 5¼-in. floppy be the standard, he said, "It looks like it will go to 3½-in. now and who knows what later."

The prognostications of Future Computing, Inc.'s David Wilson were in line with those of Hirsch, though Wilson pegged the hard-disk storage standard at 100M bytes. For increased storage, however, Wilson pointed toward the rise of optical disk storage units to which users could write data once and store up to 1G byte. Such an estimate, he added, "is quite conservative."

Wilson, an analyst with the Dallas-based market research firm, said the price for the personal computer of 1990 will be around $5,000. Wilson predicted that this price will also include a built-in local-area network interface, a 4.8K bit/sec modem, a graphics processor located on a chip instead of on a board and a color display.

On the software side, Wilson and Goldberg both predicted the increasing use of artificial intelligence in applications, with Goldberg speculating that AI will make for "softer software" that tailors itself to users' needs. An example of this, he said, is software that provides automatic data backup.

Wilson, meanwhile, said he expected no large changes in the IBM Personal Computer's operating system, other than the greater use of windows and icons and possibly even a "shell" to aid unfamiliar users.

Overall, the Personal Computer will not look or operate very differently from the way it does today, Wilson said. "What we're projecting [for the personal computer] is not revolutionary," he said, "just bigger."

What is revolutionary, observed Will Zachmann, an IDC vice-president, is the impact that increasingly powerful personal computers will have in the coming years on the corporation itself, making the micro the site of most data processing. In the future, Zachmann said, "the question will no longer be 'why can't we take it off the big computer?', but 'why can't we do it on the desk?' "

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SAS from page 53

work the same in all operating environments," according to Senior Vice-President John Sall.

Users can develop and test applications on the Personal Computer and then upload them for mainframe production runs with larger files, SAS Institute said. Also, smaller applications can be downloaded to the microcomputer.

The initial release is said to include the SAS Data step, all data manipulation procedures, basic statistical procedures, a windowing facility and the SAS Display Manager System. SAS/IML, an interactive programming facility for advanced mathematical, engineering and statistical applications, is also available.

First-year fees for corporate customers with as many as 50 workstations are $2,500 for the basic product and $1,500 for the SAS/IML facility.

The software requires systems with 512K bytes of random-access memory, a hard disk drive and PC-DOS 2.0 or later release.

SAS Institute can be reached through Box 8000, SAS Circle, Cary, N.C. 27511.

SEATTLE from page 53

tronic mail. Seattle First National does not plan to install Apple's Appletalk network; instead, the bank will hook up the machines to its existing leased-line network, Mertes said. In the future, Macintosh users will be able to access the bank's electronic mail system, which resides on its IBM 3084 Model QX mainframe.

Mertes, who said the contract primarily covers Apple's 128K-byte machine, said the bank will also buy an as-yet-undetermined number of 512K-byte Macintoshes as the situation demands. Seattle First National, whose contract also includes provisions to buy Apple Imagewriter printers, is now evaluating the firm's new Laserwriter printer, he said.

Mertes said the bank's decision to buy the Macintoshes rested on two economic criteria. Although he declined to reveal how much the bank was paying for the machines, he said the contract represented an economically sound choice, because the machines could be distributed to a wide group of people at a low cost.

"The Macintosh is also economical in terms of training," Mertes said, adding that the machine's ease of use was another deciding factor.

COMMUNICATIONS

Firms target 3270 user base

By John Dix
CW Staff

Eyeing the large installed base of IBM 3270-type terminals, three value-added network carriers announced services providing support for these synchronous devices at the recent Interface '85 communications conference.

General Electric Information Services Co. (Geisco) of Rockville, Md., unveiled the Marknet 3270 Binary Synchronous Communication (BSC) service; GTE Telenet Communications Corp. in Reston, Va., introduced support of IBM's Synchronous Data Link Control (SDLC) protocol; and Computer Sciences Corp. (CSC) of El Segundo, Calif., announced international support of 3270 BSC terminals.

The services of Geisco, GTE Telenet and CSC provide native support of IBM cluster controllers or devices that emulate one of these controllers. The controllers are polled from the carriers' network nodes, which emulate IBM 3705 and 3725 communications processors through software or special packet assemblers/disassemblers.

See SERVICES page 68

Synchronous support meets needs

By John Dix
CW Staff

While value-added network carriers have traditionally supported mostly asynchronous devices — their low operating speeds permitting the most efficient use of the leased lines used to string together network nodes — these carriers are now turning their attention to the synchronous world.

IBM's 3270 peripheral family is an alluring user base. By the end of 1984, roughly three million IBM 3270-type devices were in use — approximately 30% of all installed terminals, according to Ilene Goldman, a research analyst in charge of the workstation program at International Data Corp., a Framingham, Mass.-based market research firm.

See SUPPORT page 68

Bytex offers 4,000-port matrix switch

SOUTHBORO, Mass. — Bytex Corp. has announced a member in its family of electronic matrix switches used in backup switching and patching.

The Autoswitch 480 is said to provide nearly twice the capacity of the company's Autoswitch 240 while occupying the same floor space. The product supports 4,000 ports, or 2,000 lines per side, and a number of common interfaces including RS-232 and V.35.

According to a Bytex spokesman, the Autoswitch 480 can be used to support analog and digital communications facilities in a network with asynchronous or synchronous devices. Network devices may include terminals, modems or multiplexers and may be connected on private or common carrier analog or digital transmission facilities.

In normal operating mode, the product's digital port subsystems are said to be transparent to clock signals, treating them exactly as data. Optionally, the subsystems may be configured to provide clock signals for connections between data ter-

See BYTEX page 74

■ Symplex Communications has announced the Quantum series of data compression modems/64

■ Tymnet has expanded its Async-to-3270 service, which gives users with Ascii terminals and personal computers dial-up access to IBM 3270 applications/67

■ Northern Telecom has announced an Automatic Call Distribution Package that increases the call management capability of Northern Telecom's SL-1 private branch exchange/74

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DCA unveils enhanced time-division muxes

NORCROSS, Ga. — Digital Communications Associates, Inc. (DCA) has announced Netlink II, an enhanced version of its Netlink time-division multiplexer, and Switching Netlink, an enhanced time-division multiplexer.

The company also announced enhancements to its Series/300 line of network processors and a bit-oriented protocol pass-through software package that enables network processors to transport Synchronous Data Link Control (SDLC) traffic in an IBM Systems Network Architecture (SNA) environment over a DCA trunk.

A company spokesman said Netlink II provides voice, data and compressed video transmission at speeds up to 1.54M or 2.05M bit/sec. It reportedly is compatible with any asynchronous Ascii terminal, as well as DCA's Network Management System, which enables a manager to control the network from a central location.

Netlink II features support of traditional drop and insert for multipoint networks; redundant power supplies, logic, T1 carrier modems and facilities; support of independent trunk clocks; support of D4 framing compatibility required for connection to AT&T's Accunet T1 service; compressed or expanded Continuously Variable Slope Delta modulation technique to handle voice transmission; and automatic time of day reconfiguration.

Netlink II is available in 20- and 44-channel desktop units and is expandable to 128 channels in rack-mount form. The 44-channel Netlink II, available now, is priced at $5,795. The 20-channel version, scheduled to be available in May, is priced at $4,195.

Switching Netlink also provides voice, data and compressed video transmission at speeds up to 1.54M or 2.05M bit/sec but also offers switching capability, a spokesman said. Operators can reportedly perform switching functions with program commands, obviating the need to move ca-

See NETLINK page 74

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IBM SQL/DS and DB2 relational DBMS now on PC

ORACLE, the relational DBMS compatible with IBM's SQL/DS and DB2, is now available on the IBM PC/XT and PC/AT. While SQL/DS and DB2 run only on IBM mainframes, ORACLE runs on IBM mainframes as well as on DEC, DG, HP and most other minis and micros. Any application written for SQL/DS or DB2 will run without modification on the complete range of systems supporting ORACLE, including PCs.

SQL/DS and DB2 are relational database management systems; ORACLE is a relational DBMS plus an integrated set of 4th generation software tools for application generation, report writing, color graphics and network communications.

Oracle Corporation introduced the first relational DBMS in 1979. Now, ORACLE provides the only complete implementation of the IBM-standard SQL language available for the PC.

Oracle Corporation cites three principal application areas for its product's capabilities:

■ **The ORACLE Application Development Center** provides a PC-based development center for the creation of DB2 and SQL/DS applications. The flexibility of the personal computing environment is made available to programmers creating applications for use with IBM's relational database products.

■ **The ORACLE Personal Information Center** extends the Information Center concept to the Personal Computer. ORACLE's application generator, graphics, spreadsheet and other end-user tools provide a SQL/DS and DB2 compatible Information Center on the desktop.

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■ **The ORACLE Distributed Information Center** provides an intelligent set of communication links among multiple systems, with ORACLE running on IBM mainframes and various minis and PCs.

Using ORACLE's SQL*LINK networking facility, ORACLE on such diverse systems as MVS, VM/CMS, VAX/VMS, UNIX and PC/DOS can selectively exchange database information usiog the full capabilities of the SQL language. Applications, portable across all environments, can be run identically on any system, and data can be intelligently extracted for use at any site.

ORACLE is currently installed on over 1000 supermini and mainframe systems around the world, as well as on thousands of PCs and compatibles. Oracle's customers include 8 out of the 10 largest U.S. corporations, as well as major foreign companies and many government agencies.

For further information, contact Oracle Corp., Dept. C, 2710 Sand Hill Rd., Menlo Park, CA 94025, or call 415/854-7350 ext. 2043.

COMMUNICATIONS

CONTROLLERS

■ SBE, Inc. has introduced M68COM, a communications board compatible with Intel Corp.'s Multibus that provides eight full-duplex channels.

The Motorola, Inc. 68000-based board has four multiprotocol serial channel controllers that enable users to programs the eight channels independently. Each channel can run asynchronous, bisynchronous, X.25, Synchronous Data Link Control and High-Level Data Link Control protocols as well as be configured to support RS-232, RS-422 and RS-423 interfaces. M68COM can support from less than 5 bit/sec to 38.4K bit/sec programmable transmission rates and up to 880K bit/sec external rates.

The board offers between 128K and 512K bytes of dual-ported random-access memory with parity protection. In addition, four erasable programmable read-only memory (Eprom) sockets accommodate up to 256K bytes of Eprom.

The board costs $1,595.

SBE, 2400 Bisso Lane, Concord, Calif. 94520.

VOICE/DATA COMMUNICATIONS

■ Avanti Communications Corp. has added an option to TPAC-1.5, a programmable access unit for T1 services.

The option, Integrated Service Unit (ISU), consists of a channel service unit and data service unit, the vendor said. With the product, an AT&T Accunet user can meet Accunet's framing and density requirements without modifying existing data terminal equipment.

ISU features include integrated loopback processing and automatic clear channel sensing, the vendor said. The clear channel capability reportedly yields an additional 192K bit/sec of user bandwidth when T1 services are upgraded.

Data ports operate at speeds from 2.4K bit/sec to 1.34M bit/sec and support RS-232, RS-449 and V.35 interfaces. The product was designed for file transfers, computer-aided design and manufacturing applications and video teleconferencing.

The ISU option costs $1,900.

Avanti Communications, Aquidneck Industrial Park, Newport, R.I. 02840.

■ Digital Products, Inc. has unveiled its PrintDirector line of printer sharing products that enables asynchronous devices to share a single printer.

The PD5 has five serial ports, enabling four computers to use one printer. It is priced at $495. The PD6 has six ports, two of which can be configured as parallel ports. The PD6 device costs $695.

A PD MS 0/4D version has four serial ports with a 60K-byte print buffer. This unit costs $995.

The PD MS1 is a seven-port version (four serial and three parallel ports) with a 60K-byte print buffer and costs $1,295. The PD MS2 is a 12-port unit (eight or six serial ports with four or six parallel ports) with a 120K-byte print buffer and costs $2,545.

The PD MS3 is a 17-port (12 or eight serial ports and five to nine parallel ports) with a 180K-byte print buffer and costs $3,745. Another version, the top-of-the-line PD MS4, is a 22-port (16 or 10 serial ports, six or 12 parallel ports) unit with a 240K-byte print buffer and costs $4,895.

Digital Products, 600 Pleasant St., Watertown, Mass. 02172.

SOFTWARE

■ Software Development and Maintenance International, Inc. has introduced an IBM 3780 terminal emulator for IBM mainframes using its DOS/VSE, OS or MVS operating systems.

According to the vendor, SDM3780 can submit jobs to and retrieve output from remote job entry systems. Data files can be transferred among incompatible systems without reformatting the data or transferring magnetic tapes, the vendor said.

SDM3780 is priced at $4,500 for DOS/VSE installations and $5,000 for OS or MVS installations.

Software Development and Maintenance International, 134 Spring Ave., Furquay-Varina, N.C. 27526.

■ Datanex, Inc. has announced Hasp+ 4.3, an enhanced version of its Hasp+ communications software for users of Digital Equipment Corp. VAX and PDP-11 series computers.

According to the vendor, Hasp+ 4.3 enhancements enable users to dial multiple sites automatically with multiple phone numbers from a single queue and allows VAX systems to become the central mainframe in a remote job entry network.

Hasp+ 4.3 is priced at $5,500.

Datanex, P.O. Box 1728, Eugene, Ore. 97440.

MULTIPLEXERS/MODEMS

■ Scientific-Atlanta, Inc. has announced the Model 6403 and Model 6403M radio frequency (RF) modems that allow point-to-point communications over a broadband coaxial network.

The modems feature quadrature-amplitude shift keying digital modulation, an inverted frequency scheme and RF channel spacing of 750 kHz, the vendor said. The product supports point-to-point communications between a 6403 and Scientific-Atlanta's 6402 broadband modem without a head-end frequency translation, the vendor said.

The vendor said both modems are frequency-agile, with transmit and receive frequencies programmed by a handheld keypad. The products operate in synchronous, full-duplex mode.

The modems can be mounted in a 19-in. rack.

Model 6403 costs $5,105, and Model 6403M sells for $5,600.

Scientific-Atlanta, P.O. Box 105600, One Technology Pkwy., Atlanta, Ga. 30348.

See MODEM page 64

Micom Systems extends series

SIMI VALLEY, Calif. — Micom Systems, Inc. has announced Micro 800/2M, a data concentrator compatible with the company's modular Micro 800/2 family, which uses firmware cartridges for software changes and upgrades.

An eight-channel Micro 800/2M consists of a cabinet, chassis, power supply, removable circuit board and choice of plug-in Featurepak cartridges. Three expansion channel modules, each of which support eight terminal channels, enable support of up to 32 channels.

The Featurepak cartridge reportedly enables users to protect their investment in hardware by providing a way to accommodate changes in operating environments.

With a terminal connected to the Micro 800/2M's command port, users can gather and report statistics, troubleshoot and report alarms, the company said. Users can also alter terminal channel specifications — parity and number of stop bits, for example — using the terminal-initiated channel configuration option, the vendor reported. Other options include plug-in modem modules that support 9.6K- or 14.4K bit/sec transmissions.

Prices for the data concentrator range from $3,500 to $7,150.

Micom Systems is located at 4100 Los Angeles Ave., Simi Valley, Calif. 93063.

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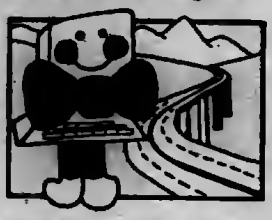

The German computer market is the largest in Europe and the third largest in the world. It has over $11 billion in installed general purpose computers. The fastest growing segment of the German computer market is the microcomputer, with an installed value of $283 million. There were 10,000 IBM PC's sold in 1983 and another 30,000 units including IBM PCjr's are expected to be installed by the end of 1984.

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PC Welt is our monthly publication specifically designed for IBM PC users. *PC Welt*'s total distribution is 50,000 and it is being sold at newsstands throughout Germany.

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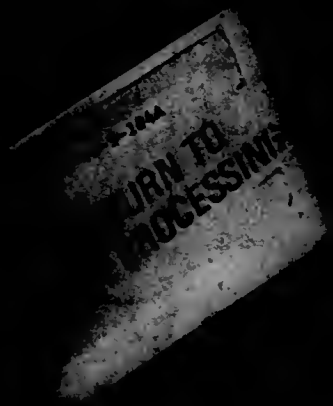

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A model of data integrity.

Instead of providing just the standard functions, Priam [redacted] designed the DataTower with all the features found in a supermini mass storage system. Including automatic error recovery and defect management to protect against accidental data loss. There's also a streaming tape drive with 60 MB cartridges, to back up data by file or entire partition.

Priam is the leading U.S. manufacturer of 8" voice-coil disk drives, in unformatted capacities of 85, 188, and 344 MB.

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The Priam DataTower. For PC mass [redacted] the best little deal in [redacted]

MODEM from page 60

■ Universal Data Systems, Inc. has announced 9600 FP, a 9.6K bit/sec modem designed for multipoint networks.

The product's automatic adaptive line equalization allows four-wire, full-duplex, private-line operation over 3002-type leased lines without manual strapping, the vendor said. The digital adaptive feature compensates for delay and amplitude distortion caused by interference in the received signal.

The vendor said that it includes a 10-position rotary switch for selecting talk or data mode, initialization mode and eight test modes. The test features include local and remote activated digital loopback, local analog loopback and 511 test pattern generation and checking. Nine front panel displays help users determine how to send and receive data.

The product features a fallback mode that will allow a user to change to either a 4.6K bit/sec or 7.2K bit/sec data transmission rate, the vendor said.

The 9600 FP costs $1,995.

Universal Data Systems, 5000 Bradford Drive, Huntsville, Ala. 35805.

■ Prentice Corp. has announced P 212 ST, a full-duplex, asynchronous modem with transmission speeds that range from 110 to 1.2K bit/sec.

The vendor said the modem is compatible with the communications command set of AT&T 212A and Hayes Microcomputer Products, Inc. modems. The product features automatic dialing, automatic answering and uses a light-emitting diode to verify connections.

The P 212 ST, which uses an RS-232 interface, costs $425.

Prentice, P.O. Box 3544, 266 Caspian Drive, Sunnyvale, Calif. 94088.

■ Astrocom Corp. has unveiled a modem emulator that operates either separately or combined with RS-232 and V.35 interfaces for intrafacility communications.

The V.35 interface is said to enable terminal-to-computer communications at up to 2,000 feet, at asynchronous speeds of up to 57.6K bit/sec or synchronously at switch-selectable speeds of 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 56K or 57.6K bit/sec. It replaces back-to-back modems and can provide interface conversion from RS-232 to V.35, according to a company representative.

The single-quantity price for the RS-232 stand-alone version is $367; for the circuit card version, the price is $235. The optional V.35 interface unit is $419 for the stand-alone version and $285 for the circuit card version.

Astrocom, 120 W. Plato Blvd., St. Paul, Minn. 55107.

■ EF Data Corp. has released its fully synthesized BCM-101 digital broadband modem, which is available in data rates of 768K bit/sec and 1.544M bit/sec.

Typical error-rate performance is 10 to the -9 power. Frequency range is 5 MHz to 400 MHz with steps of 50 kHz.

The modem costs $3,450.

EF Data, 1233 N. Stadem Drive, Tempe, Ariz. 85281.

■ Concord Data Systems, Inc. has announced the CDS 224 modem card that operates asynchronously at 300 bit/sec and asynchronously or synchronously at 1.2K bit/sec and 2.4K bit/sec.

An automatic answering feature recognizes the transmission speed of an incoming call and adjusts the modem accordingly. The vendor said the three-speed modem card is plug-compatible with many rack-mount chassis.

The product offers an optional automatic outdialing feature that supports pulse and tone dialing.

Integral diagnostics reportedly provide a fault isolation feature and include digital self-tester, analog self-tester and an internal test pattern generator and checker.

The modem sells for $865 or $895 with the autodial option.

Concord Data Systems, 303 Bear Hill Road, Waltham, Mass. 02154.

■ NEC America, Inc. has announced a leased-line modem, the DSP 19200M, that can reportedly operate asynchronously or synchronously at 9.6K, 12.2K, 14.4K, 16.8K and 19.2K bit/sec.

The modem operates over four-wire-type 3002 leased telephone lines with D1 conditioning.

The product will be available in June for $12,000.

NEC America, Data Communications Products Department, 1012 Stewart Drive, Sunnyvale, Calif. 94086.

■ Symplex Communications Corp. has announced the Quantum series of intelligent modems for data communications.

A spokesman said the Quantum series uses the same data compression and statistical multiplexing technology incorporated in the company's Datamiser data compressor. The Quantum series includes the Quantum 14.4, the Quantum 9.6 and the Quantum DSU/CSU.

The Quantum 14.4 reportedly offers 24K bit/sec line capacity, while the 9.6 and DSU/CSU offer 19.2K bit/sec line capacity.

The Quantum 9.6 is priced at $7,450, The Quantum 14.4 costs $9,950, and the Quantum DSU/CSU is priced at $6,450.

Symplex, 5 Research Drive, Ann Arbor, Mich. 48103.

See MODEM page 67

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COMMUNICATIONS

MODEM from page 64

■ **Gandalf Data, Inc. has announced a rack-mounted version of its LDS 260 synchronous local modem, called the RM3260, used in file-to-file transfer applications over privately owned lines at distances up to 2.4 miles.**

A spokesman said the rack-mounted LDS 260 modem is available in 56K bit/sec or 50K bit/sec versions. The unit supports speeds from 19.2K bit/sec to 256K bit/sec and any speed within that range. Point-to-point and multipoint operations are supported, RS-232C and V.35 interfaces are available and up to 14 rack-mounted LDS 260s fit into one 19-in. LDS 3000 rack.

Prices for the RM3260 start at $655.

Gandalf Data, 1019 S. Noel, Wheeling, Ill. 60090.

NETWORK SERVICES

■ **Tymnet, Inc. has announced an expansion to its Async-to-3270 service, which gives users with Ascii terminals and personal computers dial-up access to IBM 3270 applications.**

Users can access full-screen 3270 applications on the Tymnet public data network via Tymnet's 2.4K bit/sec dial-up Async service. New features include added printer support and end-to-end transmission and protocol conversion services.

The charge for the Async-to-3270 service — which includes conversion, rental of modems and transmission of the data — is approximately $8 to $10 per hour.

Tymnet, 2710 Orchard Pkwy., San Jose, Calif. 95134.

TEST EQUIPMENT

■ **Hewlett-Packard Co. has announced its HP 3457A, a 3½- to 6½-digit multimeter that provides seven measurement functions, extended resolution to 7½ digits and optional scanner capabilities for testing electronic components, such as disk drives, printers, plotters and modems in a computer system.**

The measurement functions include frequency, period, dc and ac currents and resistance. Users can store up to 1,060 readings or entire measurement sequences in the instrument, the vendor said.

Price of the unit is $2,800. The armature-relay multiplexer assembly costs $450, and the reed-relay multiplexer assembly costs $450.

HP, 1820 Embarcadero Road, Palo Alto, Calif. 94303.

"That's not exactly what we mean by batch processing."

■ **T-Bar, Inc. has announced it will market the PMS/1060 distributed processing network management system, developed by Thomson-TITN of France.**

A spokesman said the PMS/1060 is a hardware and software product that provides users with central control of their networks. The PMS/1060 monitors, measures and displays performance indicators in real-time, including message volume and activity and number and type of system errors for each terminal or application in the system.

Other features of the PMS/1060 include dynamic downloading, which allows switching between protocols by entering a command, selective or continuous monitoring and a data base management system incorporating the C language and AT&T's Unix.

The price of PMS/1060 ranges from $55,000 to $640,000 for systems with from 16- to 512-line capability.

T-Bar, P.O. Box T, 141 Danbury Road, Wilton, Conn. 06897.

AUXILIARY EQUIPMENT

■ **Contel Information Systems, Inc. has introduced Mind-Inventory data base software for the management of telecommunications resources with the IBM Personal Computer and Personal Computer XT.**

Mind-Inventory reportedly stores information on orders, equipment, circuits, configuration costs and maintenance. It is said to index data on the basis of serial number, equipment location, date of purchase and date of installation or other criteria.

It is said to track costs and inventory based on data input by the user.

The package requires 512K bytes of internal memory and costs $4,950.

Contel Information Systems, 130 Steamboat Road, Great Neck, N.Y. 11024.

■ **IE Systems, Inc. has introduced BIS-7705, a Honeywell, Inc. program that runs on an IBM Personal Computer with a bisynchronous communications adapter enabling Honeywell VIP 7700 or 7705 terminal emulation.**

The product allows a user to communicate with a Honeywell mainframe or controller over point-to-point or switched telephone lines by synchronous modems. BIS-7705 supports VIP 7705 functions in-

Continued on page 72

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SERVICES from page 59

Dedicated access to Geisco's Marknet 3270 BSC service is available in 63 cities and on a dial-up basis in 200 cities, according to Daniel Casco, product manager of synchronous services. Using leased lines and dedicated node ports, IBM 3271, 3276 and 3274 controllers can be supported at speeds up to 9.6K bit/sec.

Dial-in connections are limited to 2.4K to 4.8K bit/sec transmissions. The required line speed will be determined by the number of devices supported by the remote controllers and the response time desired. The dial-in access is primarily intended to accommodate personal computers emulating 3274 controllers, Casco said.

Geisco offers host connections for 3270 BSC in only 11 major metropolitan areas where it maintains network services centers manned around the clock. "This is the best way to serve the host connections, the most important interface in the network," Casco said. Hosts are supported at 2.4K, 4.8K, 9.6K and 19.2K bit/sec.

Dial-in access costs range from $3.50/hour to $12/hour, Casco said. Dedicated dial-in ports cost $380/mo to $600/mo. Dedicated leased line ports cost $320/mo.

Character charges range from 1 cent/1,000 characters to 25 cents/1,000 characters, depending on the volume of data transmitted.

GTE Telenet has offered BSC services for almost a year, according to company spokeswoman Claudia Houston, and is now supporting SDLC for users of IBM's Systems Network Architecture (SNA).

> *'[Network services centers are] the best way to serve the host connections, the most important interface in the network.'*
>
> — Daniel Casco, General Electric Information Services Co.

SDLC service requires a leased-line and dedicated-access facility at the nearest Telenet node. Houston indicated that the service is available in 25 of the 373 cities Telenet serves.

Controllers and host are supported at 4.8K or 9.6K bit/sec. Network support is provided by putting an X.25 frame around each 3270 SDLC packet, according to Houston.

The service costs $700/mo and $1,200/mo for terminal support at 4.8K and 9.6K bit/sec transmissions, respectively. The charges include fees for transmission of 75,000 and 100,000 packet/mo. Host support at the same speeds costs $1,050/mo and $1,525/mo.

Although CSC also offers domestic 3270 BSC service through its Infonet network, Bernard F. Gallagher, vice-president of network services, said its international service sets CSC apart from other carriers.

Service from the U.S. is available to Canada, Australia, Mexico, South Africa, Japan, Hong Kong, Belgium, Denmark, Finland, France, Germany, Italy, Norway, Spain, Sweden, Switzerland, the Netherlands and the UK.

IBM controllers are supported from Infonet nodes in those countries with dial-up links to dedicated node ports at 2.4K or 4.8K bit/sec or with leased lines and dedicated ports at speeds up to 9.6K bit/sec. Hosts are supported at speeds up to 14.4K bit/sec.

Four to 10 terminals would typically require a 9.6K bit/sec link. Whidden said it would not be realistic to operate more than 10 terminals on a single controller, even though it is technically feasible.

The service costs $1,200/mo and carries an additional charge of 6 cents/1,000 characters transmitted.

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SANKHYA/CORPORATION

SUPPORT from page 59

Although the economies the packet-switched carriers can offer with synchronous services are not as compelling as those offered with asynchronous services (the higher speeds eat into the bandwidth of the shared lines between carrier nodes), these relatively new services are cost-effective in certain applications.

As an example, Daniel Casco, product manager of synchronous services at General Electric Information Services Co. (Geisco), said, "We are competitive in any configuration against AT&T's Wats and pretty competitive in the dedicated-line environment."

When users have a number of sites co-located within one or two states, Casco said, it would probably be more cost-effective to go with a multidrop leased line.

The benefits of one approach over the other "depend on where you need service and how much you use the line," according to Alan Schaevitz, senior consultant and director of the San Francisco office of Network Strategies, Inc., a data communications consulting firm based in Burke, Va. "The key factor is the difference between flat-rate charges with leased services and the usage-sensitive charges of packet services.

"If you're leasing a line and using it for an hour per day, then a packet service that charges you on a usage-sensitive basis might reduce your costs quite a bit," he said. "On the other hand, if you have a lease service and use it 100% of the time at full speed, then you're not likely to find a packet service to meet your needs."

Changes cause complications

A straightforward traffic analysis will generally determine whether to go with leased facilities or packet-switched services, but changing applications can complicate the decision. Swapping micros for terminals, for example, can drastically change communications requirements.

"A person sitting at a terminal eats up line time," noted John King, executive director of James Martin Associates, a Carmel, Calif.-based consulting firm. "With personal computers, you don't have all the processing done at the central site, you can pull down a block of information to process, which lowers the utilization of the communications circuit."

Geisco's dial-in 3270 Binary Synchronous Communication (BSC) service is, in fact, targeted at personal computer users, Casco said. To access it, users must upgrade their micros to emulate an IBM 3274 controller by adding a synchronous modem, communications board and appropriate software. The Geisco nodes that support 3270 BSC emulate IBM 3705/3725 communications processors and provide local polling of the "controllers."

The one problem packet-switched carriers face with their 3270-type synchronous services is in the wooing of users. "These carriers have come in to the party so late they are facing mostly installed systems," King said. "Customers already have the bulk of their 3270s installed on multidrop and point-to-point lines."

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Continued from page 67

cluding screen formatting, polling responses, data link control and time-out control.

A vendor spokesman said that the terminal emulation package features menu-driven configuration and Help files as well as addressable VIP printer support and a Send capability.

The price of BIS-7705 is $695.

IE Systems, P.O. Box 359, 112 Main St., Newmarket, N.H. 03857.

■ General Datacomm Industries, Inc. has announced MAU-3, a high-speed, multiple access unit designed for polled, synchronous digital networks.

MAU-3 reportedly can be used as a modem-sharing or port-sharing device. It is said to enable up to four data service units, local-area data sets or terminals to share one communications device in a polled network. This capability reduces the number of transmission lines, local loops, data service units and local-area data sets in a polled network.

The product features internal or external timing and synchronous operation at speeds up to 512K bit/sec.

MAU-3 costs $1,395.

General Datacomm Industries, Middlebury, Conn. 06762.

■ Cleo Software has announced Syncable, a smart cable component option to its 3780+ and 3270 terminal emulation packages that allows asynchronous microcomputer devices to communicate with synchronous modems.

According to the vendor, the Syncable connects microcomputers directly to a synchronous modem while running under Microsoft Corp.'s MS-DOS, IBM's PC-DOS and AT&T Unix operating systems and using Cleo's terminal emulation software.

The cable option is included with the software emulation packages, which range in price from $795 to $1,295.

Cleo Software, Edgebrook Court, 1639 N. Alpine Road, Rockford, Ill. 61107.

■ Wolfdata, Inc. has introduced two X.25 dial network interface products for use with personal computers.

The WD212-X.25 Integral Modem/Packet Assembler Disassembler (PAD) and the WD212-X.25 Stand-Alone Modem/PAD are both said to conform to CCITT standards.

The WD212-X.25 combines an AT&T 212A-compatible modem with an X.25 PAD for use with IBM's Personal Computer, Personal Computer XT and Personal Computer AT and with the AT&T Model 6300, the vendor said. The stand-alone device can also be supported through an RS-232 connection.

According to the vendor, both devices have been certified by GTE Telenet Communications Corp. for dial service on the Telenet public data network.

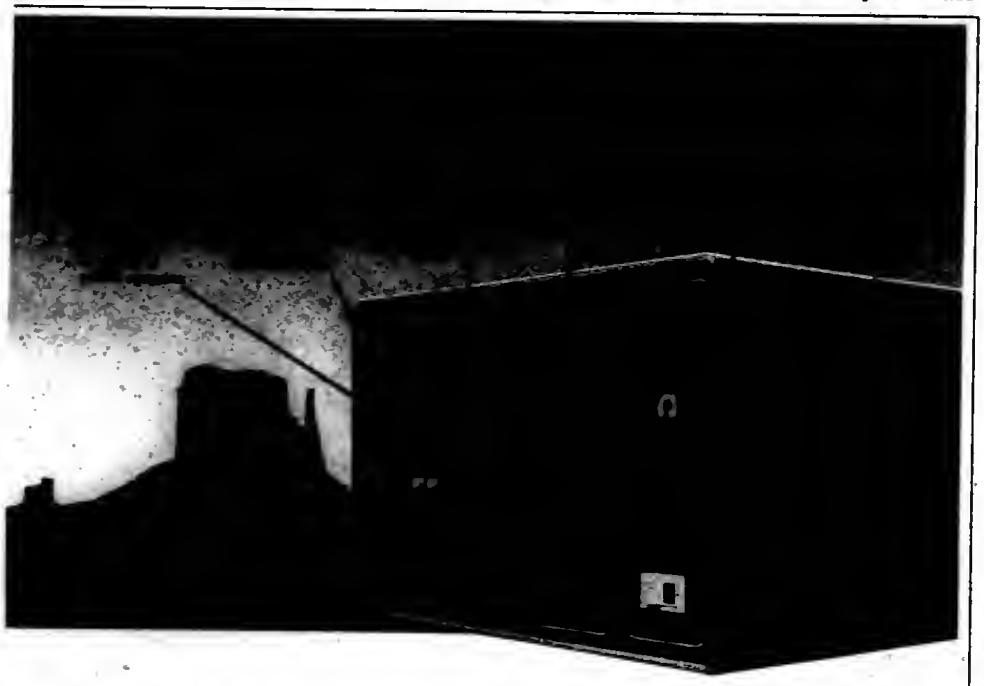
The WD212-X.25 Integral Modem/PAD is priced at $650, and the WD212-Stand-Alone Modem/PAD is priced at $695 each. Quantity pricing is also available.

Wolfdata, 187 Billerica Road, Chelmsford, Mass. 01824.

■ AT&T Teletype Corp. has announced an asynchronous adapter for its synchronous E4540 terminal system that allows the company's IBM 3270-compatible workstations to access hosts operating with either protocol.

According to a company spokesman, another keyboard-selectable option provides a horizontal split-screen mode, allowing the terminal to interact with an asynchronous and synchronous hosts simultaneously.

Continued on page 74



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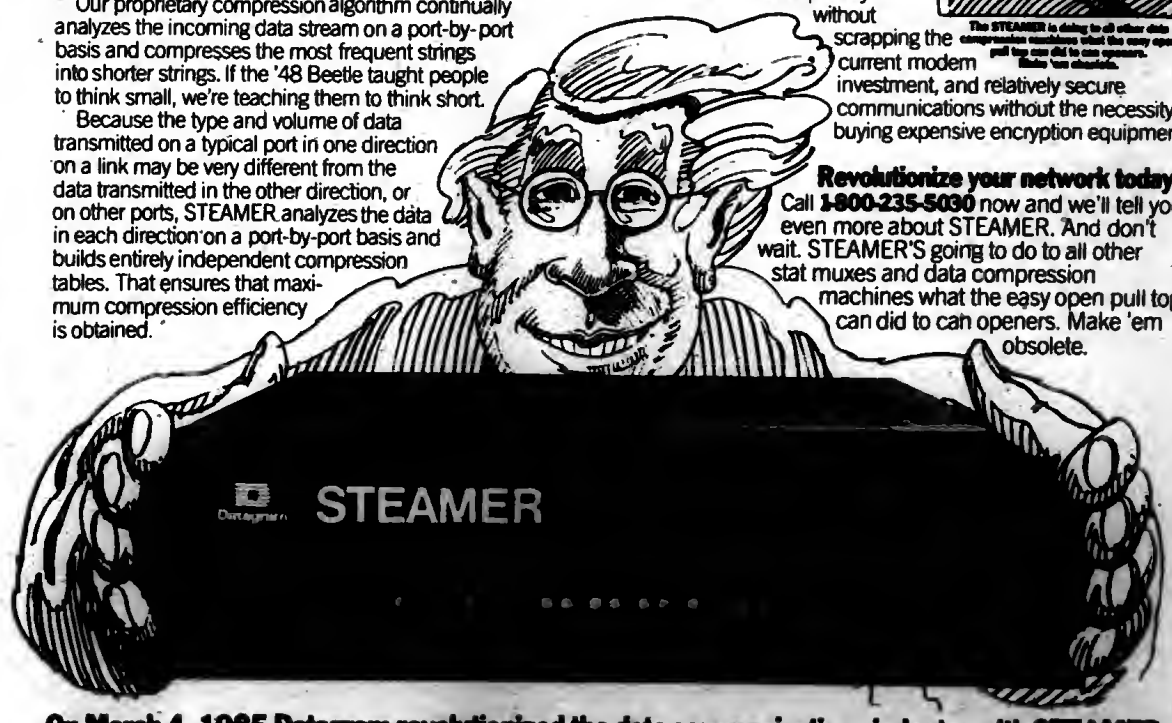

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COMMUNICATIONS

Continued from page 72

The asynchronous adapter consists of a small module and program diskette. Each module provides the E4540 displays with access to eight RS-232 asynchronous modem ports with line speeds of up to 2.4K bit/sec, the company said.

In asynchronous operation, the E4540 displays reportedly are compatible with applications programs based on the Ansi X3.64 display terminal protocol and Digital Equipment Corp. VT100 and VT52 operation.

The E4542, to be available the second quarter, is priced at approximately $900.

AT&T Teletype, 5555 Touhy Ave., Skokie, Ill. 60077.

■ **Northern Telecom, Inc. has announced its Automatic Call Distribution Package D (ACD-D) for use in conjunction with available ACD software to increase the call management capability of Northern Telecom's SL-1 private branch exchange.**

ACD-D, which runs on the SL-1 and an associated Digital Equipment Corp. PDP-11 minicomputer for report generation, is said to increase the number of possible answering stations on an SL-1 from the previous 320 to 500.

It provides ACD supervisors with terminal displays on call processing performance of all answering positions, including highlighting of deviations from the normal call processing program, such as incoming emergency calls or an increase in call waiting times.

Call information is passed at 1.2K bit/sec to a DEC PDP-11/23+ or at 9.6K bit/sec to a PDP-11/44.

The cost of the package, based upon the number of lines, ranges from $3,500 to $4,000.

Northern Telecom, 685A E. Middlefield Road, Mountain View, Calif. 94043.

■ **Microbar Systems, Inc. has introduced a single-board communications computer designed for use in AT&T Unix environments with systems built on the Intel Corp. Multibus.**

COM16 is said to function as a 16-line communications controller in a Multibus system or as a stand-alone, single-board computer in dedicated communications equipment.

It reportedly allows users to implement IBM Synchronous Data Link Control, bisynchronous and other protocols without overloading the main system processor.

It is said to feature 24-bit addressing and 8- or 16-bit data transfers; to provide IEEE 796 bus interface with eight lines of RS-232, expandable by adding eight more lines of RS-232 or RS-422; and to run 16 lines at 9.6K bit/sec full-duplex or 16 lines at 19.2K bit/sec in half-duplex mode.

The unit price is $1,890, according to the vendor.

Microbar Systems, 785 Lucerne Drive, Sunnyvale, Calif. 94086.

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NETLINK from page 59

bles, add switch boxes or make hardware changes to accomplish channel routing.

The price for Switching Netlink, which is available now, is $6,295.

The bit-oriented protocol pass-through software reportedly enables a user's Series/300 network processors to transport SDLC and most other bit-oriented protocols over a DCA trunk.

The software provides fully transparent pass-through of native-mode SNA/SDLC, the company reported.

The one-time licensing fee for the bit-oriented protocol pass-through software, scheduled to be availble in April, is $795.

The Series/300 network processors have been enhanced with a high-speed X.25 link and an Ethernet interface. The X.25 link complies with 1980 and 1984 CCITT recommendations for X.25 gateways and operates at speeds up to 72K bit/sec. The X.25 link enables a Series/300 to act as a packet switch. The Ethernet interface enables Series/300 network processors to be networked.

The X.25 link price is $4,995 for the licensing change, $4,995 for one-trunk compatibility hardware and $5,995 for two-trunk compatibility hardware. The Ethernet interface, which consists of a two-board set, is priced at $5,995.

DCA is located at 303 Technology Park, Norcross, Ga. 30092.

BYTEX from page 59

minals. This configuration is said to increase throughput.

With a single command at the system's CRT System Control Console, a group of digital ports can be switched to a like group of ports or single analog or can be attached across the switch to like ports.

Autoswitch 480 provides audit and control information and trend determination, the vendor said. It features password security, preprogrammed command sequences, time-driven commands and event-driven commands. The product is fault tolerant and redundant.

Autoswitch 480 costs range from $30,000 to $200,000, depending on configuration.

Bytex is located at Southboro Office Park, 120 Turnpike Road, Southboro, Mass. 01772.

"I'm worried, Doctor, his screen is pale."

SYSTEMS & PERIPHERALS

HARD TALK
Tom Hankel
CW Senior Editor

Hitachi volleys IBM's Sierra

Judging by Hitachi Ltd.'s swift response to IBM's Sierra announcement, the Japanese electronics giant clearly has been doing its homework. Hitachi's two high-end processors, announced in the U.S. as National Advanced Systems Corp.'s (NAS) AS/XL line, appear to match the performance of IBM's 3090 Model 200 and Model 400 processors almost exactly.

Because it is highly unlikely that Hitachi whipped the two machines together in the month that passed between the IBM and Hitachi announcements, Hitachi's competitive analysis people appear to have had the IBM Sierra announcement pegged, apparently without IBM's help. Recall that it has been a little more than two years since Hitachi, National Semiconductor Corp. and NAS were named, along with several Japanese electronics firms, in an IBM trade secrets lawsuit in which IBM claimed the Japanese were trying to swipe its high-end mainframe plans.

If everything goes according to plan, Hitachi's high-end mainframe, which is marketed by NAS as the AS/XL Model 80, will be available about a year earlier than IBM's equivalent 3090 Model 400. But bear in mind that both the Model 80 and Model 400 employ fairly complex emitter-coupled logic circuit technology. As is often the case with new technology mainframes, last-minute problems can sometimes delay early shipments.

It is too early to speculate whether either NAS or IBM will have such problems.

But an interesting omission from Hitachi has some some analysts a bit skeptical. Hitachi refuses to release the machine cycle times for the new boxes, claiming the figures, which are freely released on its other CPUs, are now confidential. Some analysts have said the firm's refusal to disclose cycle times could mean the Hitachi machines are paper tigers. It won't take long to find out, however. Hitachi says it will begin

See NAS page 82

Altos unveils 32-bit micro

By Kathleen Sullivan
CW West Coast Bureau

SAN JOSE, Calif. — Altos Computer Systems this week will become the first company to introduce a multiuser microcomputer system that incorporates Motorola, Inc.'s 32-bit 68020 microprocessor, according to the company.

Dubbed the Altos 3068, the system will run AT&T's Unix System V operating system and support up to 30 users, according to Phillip E. White, Altos' senior vice-president of marketing.

In its base configuration, which is said to support 10 users, the Altos 3068 includes a 1.2M-byte floppy disk drive, 1M byte of random-access memory (RAM) and a 20M-byte hard disk drive. The Altos 3068 will be able to accommodate up to three 5¼-in. hard disk drives. The firm offers both 33M-byte and 68M-byte disk drive modules, which come with built-in power supplies, White said. As an option, a 60M-byte streaming tape drive is available.

The Altos 3068, which is mounted on a floor-standing chassis, is said to include five boards, each of which serves a distinct function. In a standard configuration, the Altos 3068 includes a CPU board, a RAM board, a two-board file processor subsystem and a serial communications subsystem board.

In addition, the Altos 3068 is said to include three expansion slots, which can be used to support more users or more memory, White said.

See ALTOS page 78

Challenger boasts IBM fit

Harris VDTs offer 3270 compatibility

By Donna Raimondi
CW Staff

DALLAS — Harris Corp. has issued its Challenger Information Display System series of CRT terminals, control units and printers that are compatible with IBM 3270 series products at the device level. The units reportedly can also be attached to other current Harris interactive system devices, such as those supported on Harris' 9200 and 9116 systems.

The Challenger system supports both local and remote configurations in IBM Systems Network Architecture/Synchronous Data Link Control or Binary Synchronous Communications protocols, the vendor said.

According to Harris, 3270 compatibility is implemented at both the host and device levels. Remote communications speeds ranging from 1.2K to 56K bit/sec in either half- or full-duplex modes are supported.

The Harris line includes the H274-41A floor model local controllers and H274-61C/41C desktop remote controllers. The H274-41A local model costs $5,364 and

See HARRIS page 79

■ Mentor Graphics unveiled a Hardware Modeling Library for Apollo Computer Domain local-area networks/79

■ Bell & Howell unveiled the COM printing system that is compatible with IBM mainframes/82

INSIDE

Turnkey Systems/82

Memorex subsystem hits U.S. market

SANTA CLARA, Calif. — Memorex Corp. has released its IBM 3370-type disk subsystem for the U.S. market. Previously, the subsystem was available only in Europe.

Called 3690-2, the unit can be attached to IBM 4331 Models 2 and 12, 4341, 4361 and 4381 CPUs. It is said to be functionally equivalent to the IBM 3370 Model 2.

According to Memorex, the subsystem may be attached to IBM's 3880 storage control units. It can also be attached to integrated Dasd adapters on 4331 and 4361 CPUs or to a high-speed block multiplexer channel via the Memorex 3888 or 3696 dual director storage control units.

The 3690-2 employs a fixed-block architecture and has a reported storage capacity of 729.8M bytes per spindle. Each unit within the 3690-2 subsystem has a single spindle with a vertically mounted head disk assembly.

Up to four units reportedly can be included in each string. Each head disk assembly is said to be accessible by two independently addressable actuators, according to the vendor.

The subsystem is priced at $35,480 for the 3698-2 string controller and disk drive and $26,600 for the 3690-2 disk drive units. Leasing arrangements are also available.

More information is available from Memorex, San Tomas at Central Expwy., Santa Clara, Calif. 95052.

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[illegible] 1700, the 1778 fits in places an [illegible] And it comes with ergonomic [illegible] A tilt/swivel [illegible] or green. Blinking [illegible] And an optional

ALTOS from page 75

The CPU board, which is built around a 68020 microprocessor that runs at 12.5 MHz, includes a number of features that enhance the system's performance, White said. The Altos 3068 is said to feature an 8K-byte data and cache memory, which is organized as two 4K-byte sets that allow the CPU to run at up to 18 MHz with no wait states.

The memory management unit reportedly supports demand-paged virtual memory and includes a high-speed address translation cache for further performance improvement, the company said. The new system reportedly allows up to 16M bytes of virtual address space per program. An optional 68881 floating-point processor can be added to the CPU board.

Altos designed three RAM boards for the new system, featuring 1M, 2M and 4M bytes of memory, respectively. Users reportedly can expand the system up to 16M bytes.

The Altos 3068's file processor subsystem is included on two boards; one board contains storage device controllers, while the other includes an Intel Corp. 8086 microprocessor that manages file access, White said.

The 8086 chip controls four direct memory access channels, which reportedly allow the transfer of data between peripheral devices and internal memory without the intervention of the CPU. The channels handle the system's hard disk drives, streaming tape, floppy disk drive and parallel printer port.

The company is offering two serial communications subsystem boards for the Altos 3068, White said. Each board is said to include an 8086 microprocessor running at 8 MHz, and each has 10 serial ports.

Two ports are available for hooking up synchronous modems; another supports the company's Worknet local-area network. When attached to the Altos 3068, Worknet reportedly transmits data at 1.4M bit/sec.

Board features

The standard serial communications board features 32K bytes of RAM, while the optional board has 128K bytes of RAM and reportedly will support X.25 and Systems Network Architecture (SNA) protocol software.

The Altos 3068 is said to be able to support asynchronous modems for dial-up data base services or off-site communication. Also, the system reportedly provides communication with IBM mainframes, offering IBM 3270 and 3780 bisychronous communication and 3270 SNA/Synchronous Data Link Control communication.

The Altos 3068 runs Release 2, Version 2 of the Unix System V, including record and file locking, virtual memory and multiple swap areas, which allow users to configure the number and size of swap areas on a disk. Altos reportedly plans to introduce applications software specifically tailored to the system this summer.

In its base configuration, the Altos 3068 will be priced at $7,000 in OEM quantities. White said shipments will begin in July.

Further information is available from Altos Computer Systems at 2641 Orchard Pkwy., San Jose, Calif. 95134.

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Mentor Graphics unveils HML for simulation modeling

BEAVERTON, Ore. — Mentor Graphics Corp. has released its Hardware Modeling Library (HML) device that connects into Apollo Computer, Inc.'s Domain local-area networks. HML uses large-scale integration/very large-scale integration (LSI/VLSI) devices as simulation models for logic and fault simulations.

The HML system accepts off-the-shelf components, semicustom and full-custom integrated circuits and existing printed-circuit board subsystems as models. It allows the LSI/VLSI devices to run at their rated clock specifications, accepting clocking at rates up to 16 MHz.

The HML is part of the design engineering data base, and users do not know if they are using the software simulation in the network or the HML hardware simulation. Reportedly, the HML unit becomes an extension of the simulation library, available to multiple concurrent users across a workstation network.

Integrated circuit interface boards are inserted into HML's backplane. A 256-channel I/O port is also available for interfacing printed-circuit boards or subsystems to the HML.

Another option is real-time, asynchronous sampling of signal timing behavior on all active pins of the component.

The HML system is a stand-alone chassis that contains a control processor, from 1M to 2M bytes of memory used to store vectors of information and up to eight cards that can contain between one and four chips that will make up the hardware library. Prices start at $39,900 without the parts library. The HML will be available in July 1985.

Mentor Graphics is located at 8500 S.W. Creekside Place, Beaverton, Ore. 97005.

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Net/One from Ungermann-Bass

HARRIS from page 75

supports 32 devices. The H274-61C remote unit costs $7,200 and supports 16 devices. It can be upgraded to the H274-41C remote model, which costs $11,760. All controllers are available now.

The H180 (an IBM 3180 equivalent) has an optional display message printer that provides desktop, hard-copy output. The H180 costs $1,795 and will be available in June. The H179, a color version, costs $2,195 and will be available in November.

The H178 (an IBM 3178 equivalent) has a 12-in. display and supports a variety of keyboard styles, the vendor said. It costs $1,524. Also available is an IBM 3270 Personal Computer look-alike, the H270PC, which costs $6,995 and will be available in September.

A letter-quality printer — the H188 (an IBM 5210 equivalent) — offers printing at 55 char./sec from 6 to 8 line/in., 10 or 12 char./in., and up to 132 columns. The H188 costs $5,364.

The H187 dot matrix printer, which competes with the IBM 3287 printer, is a 200 char./sec unit with a near-letter-quality speed of 45 char./sec and a 52-db noise level, the vendor said. It costs $5,100. Another dot matrix printer — the H168 — competes with the IBM 3268. It is a 56.6-lb, 400 char./sec machine with a noise level of 55 db. The price of the H168 is $6,600.

More information is available from Harris, P.O. Box 809022, 16001 Dallas Pkwy., Dallas, Texas 75380.

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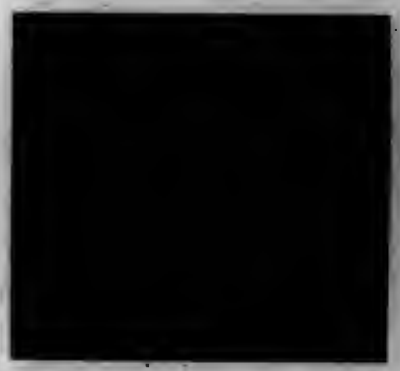

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TURNKEY SYSTEMS

■ **Bell & Howell Co.'s Computer Output Microfilm (COM) Division has introduced a COM printing system for small- and medium-volume users that creates cut-fiche masters directly on-line to IBM and compatible mainframes under IBM's MVS or DOS/VSE operating systems.**

The system includes Bell & Howell's 6650XP COM Printer, either a CRT or hard-copy terminal, primarily used for runtime messages, and host-resident software.

The 6650XP runs up to 26,000 line/min and is controlled through an existing operator terminal. It reportedly emulates an IBM 3211 paper printer.

The 6650XP costs $93,500.

Bell & Howell COM Division, 16691 Hale Ave., Irvine, Calif. 92714.

NAS from page 75

delivery of the new machines to Japanese buyers in the fourth quarter. NAS will begin U.S. deliveries six months later.

■

Speaking of paper tigers, there are rumors afloat that the newly announced IBM 3090 Model 200 may meet a fate similar to the company's 3081 Model D.

IBM announced the Model D in 1981 amid mounting pressure from users and speculation from analysts about IBM's future systems strategy. According to some observers, IBM announced the Model D to put an end to the speculation. A few months later, the company essentially replaced the Model D with a better machine, the 3081 Model K.

Rumor has it that the same thing may happen to the Model 200 because IBM, facing flat first-quarter earnings, is hoping the lackluster performance of the Model 200 (despite its impressive floor-space savings) will spur users to buy more 3080 series CPUs while waiting for the appearance of the 3090 Model 400 in 1987.

Once satisfied with 3090 sales, IBM could beef up the performance of the Model 200 or unveil a new model that offers everything the Model 200 does and more. This rumor may be supported, or quelled fairly quickly, when IBM's official 3090 delivery schedule hits the streets. If IBM plans to deliver only a handful of the Model 200 CPUs in the first half of 1986, the paper tiger claims may have some basis.

■

Still breathing? While NAS, Amdahl Corp., Storage Technology Corp. and Memorex Corp. have been getting a lot of attention recently in light of IBM's Dasd and high-end mainframe announcements, this may be a good time to start wondering whatever happened to the other plug-compatible manufacturers. Remember the companies in the IBM 4300-compatible marketplace, such as IPL Systems, Inc., Cambex Corp., Nixdorf Computer Corp. and Global Ultimacc Systems, Inc.? Quiet hardly describes their actions in the past year. The 4300-compatible marketplace was blasted by IBM's 4361 processors and the high-end 4381 Model Group 3. Firms competing in that market have not been helped by the formidable competition from a slew of superminicomputer vendors, including Prime Computer, Inc., Digital Equipment Corp. and Data General Corp.

Some analysts say the 4300-compatible business is at an all-time low and headed downward. The next six months may be a telling period for 4300-compatible vendors, some of which have seen their stocks drop to about $2 a share, down from the high teens a few months ago.

■

Reverse psychology? When DEC unveiled its VAX 8600 processor last October (CW, Nov. 5), it made a point of touting the machine as a competitor to IBM's 3084. Apparently trying to set itself up as a competitor to IBM's mainframe accounts, DEC noted that seven 8600s linked in a Vaxcluster configuration offered roughly the same performance as the 3084. Now DEC's claims may be taking an interesting twist. Some Amdahl salesmen have gotten the idea that if it takes seven VAX 8600s to equal one 3084, maybe some of those big Vaxcluster accounts would like to buy one of Amdahl's 580 series processors instead. The enterprising idea seems to make sense; time will tell if it is successful.

"No other single publication reaches the computer marketplace like Computerworld."

Bob Gildenberg, Vice President, Marketing, Philon, Inc., NY, NY

Bob Gildenberg is Vice President of Marketing for Philon, Inc. He is responsible for marketing fast-executing compilers for UNIX-based microprocessors. To sell his product, PHILON FAST/Compilers, he has to talk to executives at hardware manufacturers, software houses, systems integrators and VAR's, as well as government and selective end-user organizations.

He has found, through experience, that even though Computerworld is primarily positioned as an MIS/DP publication, it does the job for him.

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COMPUTERWORLD

COMPUTER INDUSTRY

Edelman takes control of Datapoint

NEW YORK — Datapoint Corp. announced here recently that it has agreed to make Asher B. Edelman chairman of the company and give him control of half of the seats on the board of directors. The negotiated truce ended Edelman's effort to solicit consents from shareholders to replace the current board.

The settlement marked the third time that Edelman has forced a computer manufacturer to accept his proposal to split up the divisions of a company and sell them off to the highest bidders. He previously forced the liquidation of Management Assistance, Inc. and was appointed vice-chairman of Mohawk Data Sciences Corp., which is also attempting to liquidate.

It was reported that Datapoint, the San Antonio-based manufacturer of computers and office automation products, had agreed to pay expenses incurred by Edelman in his battle to acquire the company. Edelman has acquired 11.9% of Datapoint and will replace Harold O'Kelley, who has resigned the position of chairman, it was announced.

The settlement came after Datapoint lost a court hearing over new bylaws it had instituted in an effort to delay Edelman's bid for control.

Following the rejection of his earlier bid to purchase all outstanding stock for about $23 a share and the adoption of the bylaws requiring a waiting period for soliciting consents from shareholders, Edelman challenged the bylaws in court and mailed out solicitations for the consents.

Unlike proxies, soliciting consents enables a dissident shareholder to force a management change upon the collection of consents representing a majority of shares without having to call the shareholders together for a meeting.

Datapoint posted a loss of $15.9 million on revenue of $129.5 million in the quarter ended in January. In fiscal 1984, ended last July, it posted profits of $28.2 million on revenue of $600.2 million.

During its battle for the hearts and minds of shareholders, Datapoint management said it also wished to sell the company but argued that it was better suited to that role than Edelman.

Datapoint indicated that it believes $200 million can be raised through the sale of its service operations and another $100 million can be raised through the sale of its manufacturing operations.

The company reported that it sold its Inforex subsidiary to Recognition Equipment, Inc. for $12 million in cash and the assumption of about $2.5 million in liabilities.

■ Wilton H. Jones, the man who transformed a consulting company into Multimate International, sat down to talk in depth about a number of issues facing the micro software industry/86

■ The U.S. government recently declared an interest in loosening up export regulations for Eastern-bloc-destined high-tech goods that are already available on the world market/87

■ Micro manufacturer Kaypro recently settled an antitrust suit lodged by the state of California, which charged the company with threatening dealers who did not follow pricing guidelines/88

Trilogy revival in CEO's hands

By Kathleen Burton
CW West Coast Bureau

CUPERTINO, Calif. — Six months after abandoning the highly ambitious plans on which the company was founded, Trilogy Ltd. still has a bright future, in the eyes of Henry Montgomery.

Characterized by some industry analysts as a corporate "Doctor Fix-it," Montgomery was brought in as president of Trilogy last September and in December assumed the role of chief executive officer from Gene Amdahl, company founder and chairman.

According to Montgomery, Trilogy is trying to turn the technologies developed during its aborted wafer scale integration project into cash and is also considering acquisition of a start-up semiconductor firm as a possible investment.

"There's a treasure trove of potential here, but we have to focus on the most feasible alternatives due to our finite financial resources," Montgomery said during a recent interview. Trilogy's cash reserves at the end of 1984 were $85 million, compared with about $276 million initially raised through a variety of sources when the company was started in 1980, according to Montgomery.

He conceded that Trilogy still has no

See TRILOGY page 92

S & H barred from selling Indas

By Peter Bartolik
CW Staff

NASHVILLE — A federal judge here has permanently enjoined S & H Computer Systems, Inc. of Nashville from marketing its Indas data analysis system, which SAS Institute, Inc. successfully claimed was derived from its SAS program.

U.S. District Court Judge Thomas A. Wiseman Jr. issued the injunction earlier this month in a 32-page judgment that found that "S & H's primary purpose in obtaining [an SAS] license was to obtain detailed technical information not otherwise available for use in the preparation of its conversion of SAS to run on [Digital Equipment Corp.] VAX computers."

S & H initially filed suit seeking a declaratory judgment that it was not violating a copyright. The civil suit was tried without a jury in September 1983. SAS Institute charged S & H with copyright infringement, breach of contract, fraud,

See SUIT page 88

INDUSTRY INSIGHT/PETER BARTOLIK

Cbema fails to grasp logic of VDT fears

The Computer and Business Equipment Manufacturers Association (Cbema) must have been headquartered in Washington, D.C., for too long. Its spokesmen are beginning to sound like those of the tobacco lobby.

Cbema quickly lobbed a charge of irresponsibility in the direction of a Massachusetts firm that introduced a radiation shield to attach to VDT screens [CW, March 11]. The organization added that the company marketing the shield, said to block 98.5% of low-frequency electromagnetic waves generated by a VDT screen, "is exploiting the fact that radiation is very hard to understand for non-scientists."

As far as I know, there is no proof that wearing a mail carrier's uniform is a direct cause of dog bites, but I'm sure that doesn't stop mail carriers from taking preventative action.

It is generally believed that there is still no cure for the common cold. But that doesn't stop people from using cold

See LOBBY page 87

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*Based on inventory for Vehicle Leasing and Services Division, which does business as Ryder Truck Rental. source 1983 Ryder Systems, Inc. Annual Report and Third Quarter Report, 1984

Proposed software rental ban warrants careful review

OUTSIDE LINES
L. J. Kutten

During the past year, a segment of the software industry has clamored for a law prohibiting software rentals. Some companies claim they suffer incalculable lost revenue as a person rents software not to "test drive" the program but rather to make a pirated copy.

These cries of woe have not fallen upon deaf ears. Late last year, U.S. Sen. Charles McC. Mathias Jr. (R-Md.) introduced a bill that would prohibit software rentals.

The senator said the bill will be reintroduced this year.

The proposed law states that in spite of the fair use doctrine, "unless authorized by a copyright owner, the owner of a particular copy of a computer program may not, for purpose of direct or indirect commercial advantage, dispose of or authorize disposal of the possession of the copy by rental, lease or lending or by any other activity or practice in the nature of rental, lease or lending."

As I see this bill, it will cause more problems than it will solve. These problems arise from the fact that the Copyright Act, 17 U.S.C. § 101(n), defines a computer program as "a set of statements or instructions to be used directly or indirectly in a computer program to bring about a certain result." There is no requirement for the computer program to have any particular characteristics or that it even be stored on magnetic media.

As drafted, this bill could legally prevent any library from loaning out any book or magazine that contains a computer program without first getting the software copyright owner's permission. To do otherwise could make the library liable for copyright infringement.

But let's assume the bill is modified to apply only to computer programs on magnetic media. What personal property do you own that contains a computer program? A brief survey of my home and office disclosed the following: alarm clock, coffee machine, washing machine, dryer, videocassette recorder, stereo receiver, record player, cassette tape deck, microwave oven, ceiling fans, sewing machine, telephones, telephone answering machine, refrigerator, photocopier, typewriter, portable calculator, two microcomputers, disk drives, modem, computer printer and last but not least, my car.

Illegal to rent microwave oven?

The bill as drafted does not require that the computer program be a stand-alone item. Does this mean that before any of these goods can be rented, I must get the manufacturer's permission? Could I be sued for copyright infringement because I rented a microwave oven for the weekend?

OK, let's assume the bill is amended to apply only to computers and computer programs.

First the entire industry of leasing computers can be put at risk. What happens if Apple Computer, Inc., IBM, Honeywell, Inc., NCR Corp., Tandy Corp. or any other hardware manufacturer says it wants to control all the leasing of its hardware? Under this bill, it could legally do so. What a perfectly legal way to eliminate competition.

Too outrageous, you say; no court would enforce it. OK, let's limit the bill to just applications software.

Consider applications software embedded in hardware. Does the fact that

See RENTAL page 92

Kutten is a writer specializing in computer law topics. He is a member of the Illinois and Missouri bars. His book, Computer Buyer's Protection Guide, *was published last year by Prentice-Hall, Inc.*

Introducing Quadnet.
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Quadnet comes with its own powerful multi-user operating system. Perfectly compatible with PC-DOS, Quadnet software lets you keep your current software and add on exciting multi-user packages. And while some systems limit each user to about 360K worth of data (just enough for one floppy disk), Quadnet lets you segment your hard disk any way you like.

When you're ready to order, all the accessories are pre-packaged so you're sure to get everything you need to get your Quadnet system up and running. The master package includes hardware, software and documentation. A workstation kit contains hardware for one workstation. And the cabling kit comes complete in three workstation increments.

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Wilton H. Jones

Without the blessing of venture capital, Wilton H. Jones transformed W.H. Jones & Associates, a consulting firm, into Multimate International Corp., one of the premier suppliers of microcomputer word processing software.

In 1981, Connecticut Mutual Life Insurance Co. hired the consulting firm to produce a micro word processing package with commands and capabilities that resembled a Wang Laboratories, Inc. word processor. When the package was completed, Jones began marketing it to other large insurance companies. Multimate has since grown into a $25 million company with 150 employees.

Computerworld senior writer Paul Korzeniowski recently interviewed Jones at Multimate headquarters in E. Hartford, Conn.

Q *Will the microcomputer software market soon shift to a product like IBM's Topview or [Digital Research, Inc.'s] Gem?*

For the next six months, [Microsoft Corp.] MS-DOS or [IBM] PC-DOS will remain the principal operating systems. Right now, Topview represents an unknown that most software companies are examining. Since it has the IBM name, it has a good chance of becoming a standard. But Topview does not seem to be as technically advanced as [Microsoft Corp.'s] Windows.

We expect the industry to adopt a package like Topview, so we are looking very carefully to see what company will produce *the* product that ties our package to [Lotus Development Corp.'s] 1-2-3 or a graphics package.

I don't think that users will notice a shift toward operating environments until 1986. It will take at least another year for one package to become popular and for companies like us to convert our products to it.

Q *Will a Topview-like package run under PC-DOS, [Microsoft's] Xenix or [AT&T] Unix?*

It will run under whatever IBM pushes. We have not observed much Unix activity yet. Users primarily work with PC-DOS operating systems.

Q *What products are large companies endorsing?*

They are confident in IBM — the name and the hardware, so most companies support the IBM [Personal Computer] and packages like Lotus' 1-2-3, Multimate and [Ashton-Tate's] Dbase II or Dbase III.

Companies realize that some employees may . . . be best able to use an [Apple Computer, Inc.] Macintosh or a Unix-based machine, so [they] have bought a few of these machines and are evaluating them. It will take time before Topview and the Macintosh are accepted in the corporate environment.

Q *How important is graphics to a user?*

Integrating text and graphics will soon be a requirement for most general-purpose packages. White-collar employees work with charts and graphs and need a mechanism to take a data base file or information from a memo and insert or convert it into a chart.

By the third quarter, we plan to offer a package that will allow a user to draw a graph with one package, save it and incorporate the graph in a Multimate document. By 1986, packages will have to incorporate video and voice as well as graphics.

Q *What word processing enhancements can users expect?*

We think the day will come when a word processor will check a customer's sentence structure. There are syntax checkers available now, but they are inefficient or require a mainframe. With the [IBM Personal Computer AT], we are starting to possess processing power capable of running a syntax-checking package. Other advancements are being made, such as chips that search for key words or match speech patterns.

Q *Will the Macintosh be accepted in large corporations?*

When a company spends $100 million to promote a product to the business community, it perks interest. But we may have a problem translating our product to the Macintosh because it is a different world. We don't think we can port our existing product onto the Macintosh effectively, so we must develop a new product and a new product line. Today, Multimate on the Macintosh is true vaporware, and we wouldn't produce anything until late [this year] or early 1986.

Q *How do you view IBM's recent moves into the microcomputer software market?*

For all practical purposes, IBM is our biggest competitor. There are a few items we try to offer that they do not offer. We offer service, support and a guarantee of future updates and improvements. For corporations, the question is: Will Multimate be in business in a few years? [They] are positive that IBM will exist, but they are not sure about us.

Q *What steps does Multimate have to take to stay in business?*

Our product has to be kept current. When someone announces new features and functions, it is not imperative that we have them on the day they are announced, but we must incorporate them within six months. Our customers expect us to update the product so it has the latest and best word processing functions. When IBM opened the door to [Document Content Architecture], which allowed documents created with its Displaywriter to be moved to other IBM systems, we followed suit.

We don't feel we have the answer to word processing. We feel we have to generate new products to keep up with the competition.

We produce three updates a year. In 1985, we will also expand our product line and add word processing packages for vertical and technical markets.

Q *Do you intend to remain strictly a word processing company?*

We have [to go] a long way to capture a large percentage of the market. Today, we have only 10% of the IBM [Personal Computer] market; we would like to have 30% or 40% of that market. It may take two years to get to that point. It becomes cost-prohibitive to try to capture more than that. When a company reaches the 30% to 40% mark, it competes with products like the Displaywriter, which has a niche and a known name.

Q *How important is advertising to a product's success?*

We don't believe in spending large sums on promotional advertising during football games or the Super Bowl. We don't think it pays off. We cut our advertising budget from $350,000 [a month] to $50,000 a month, and there was no impact on sales.

Something is missing in software advertising. There are too many things that a potential customer doesn't understand. He knows little about word processing and needs training to determine if a package is designed for him. We can't overcome this limitation through advertising.

Q *How do you respond to the claim that advertising costs are preventing small companies from entering the market?*

It is not just advertising but shelf space, channel of distribution and other items that may stop the emerging company. With a new product, a company should first try to find a niche and then leverage its way into the market through the niche.

A company should find a vertical market, [such as] a data base for doctors. Then it could build from that market. Yet no company has followed our example. There are a few companies attempting to leverage their positions by enhancing Lotus' 1-2-3. These companies are supplying templates for the product. I think that is a good marketing strategy, and I think these companies will be successful.

Q *What is the future of networking?*

Right now, only 10% of our users have a net-

See JONES page 92

SPECIAL REPORT

Micros in Big Business

In the April 29th Computerworld Special Report we'll report on management strategies for integrating micros into corporate information systems; offer users' experiences with micros; discuss the emergence of the Personal Computing Manager; provide overviews of business-related microcomputer hardware, applications software, and systems software; look into security risks; and examine how large MIS/DP organizations are networking their micros.

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COMPUTER INDUSTRY

Agency moves to ease trade

By Bryan Wilkins
CW Washington Bureau

WASHINGTON, D.C. — The U.S. Department of Commerce is proposing regulations to ease export restrictions on U.S.-manufactured computers, telecommunications products and technical data, if similar products are being sold to Eastern bloc countries or are available in foreign countries.

Commerce Secretary Malcolm Baldrige said the proposed regulations would remove current controls on certain U.S. exports when those goods are of such comparable quality and are available to Eastern bloc countries in sufficient quantities that "controlling them would no longer improve the U.S. national security."

Baldrige described the proposed regulations as "a cautious approach" to the issue of availability of foreign products that are similar to U.S. models. The rules that Baldrige proposed would spell out the procedures that both the exporter and the U.S. government must follow.

Unfavorable response to controls

U.S. companies have recently responded unfavorably to the strict export controls placed on U.S. technology. The U.S government had instituted these controls to prevent U.S. technology from falling into the hands of Eastern bloc countries, particularly the Soviet Union, and helping with the modernization of their armed forces.

In determining the comparability of foreign commodities and technical data, the Commerce Department said it would consider the following factors: end use, similarity of design or resolution of technical problems and similarity of performance and reliability characteristics.

The Commerce Department outlined the types of information that would be required from an exporter seeking to decontrol a product that was also available in a foreign country, such as non-American sources and their addresses, name and model design, technical information on its performance and quality and information on production and demand including data on trade of the item to Eastern bloc countries.

Comments on the proposed regulations that were published in the federal register March 15 must be received by May 14 at the Commerce Department's Office of Export Administration.

LOBBY from page 83

remedies, nor does it stop the marketing of a wide array of these cold remedies.

Certainly there has been no conclusive proof that VDTs cause radiation-related maladies. Studies to date — and they all seem to be generated by somebody that has already taken a position on the issue before conducting the study — have been quite contradictory.

No law against precautions

There is no law preventing people from taking precautions. Who in this country would dare tell a pregnant woman that she shouldn't worry about the effects of low-level radiation on her fetus because conclusive evidence won't be available for another five years or so? The attitude that "What hasn't been proven, simply doesn't exist" is the same attitude that coated the nation's schools in asbestos and allowed the chemical contamination of hundreds of drinking water aquifers.

The day may come when it can be proven that VDTs pose no health hazards. But if the evidence goes the other way, there is going to be hell to pay.

Perhaps Chema should move its headquarters to California and try to "mellow" a bit. It would be a real shame if someday that lobby is held in the same light as the nuclear power lobby.

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Kaypro settles antitrust suit out of court

Firm agrees to halt alleged coercive acts

SOLANA BEACH, Calif. — The state of California announced the recent out-of-court settlement of an antitrust suit against Kaypro Corp., charging that the microcomputer company threatened to revoke the dealership status of California retailers selling Kaypro products below list price.

Under terms of the settlement reached earlier this month, Kaypro agreed to refrain from allegedly coercive practices and to pay the state $19,500 in civil penalties and court costs. The company neither admitted nor denied the charges of coercive pricing.

California Deputy Attorney General Wayne Liao said Kaypro expressed interest in settling out of court shortly after the state subpoenaed documents from the firm. The stipulated and final judgment was announced when the suit was formally filed March 7 in the state court in San Diego.

"We believe the settlement is comparable to a favorable trial result," Liao said.

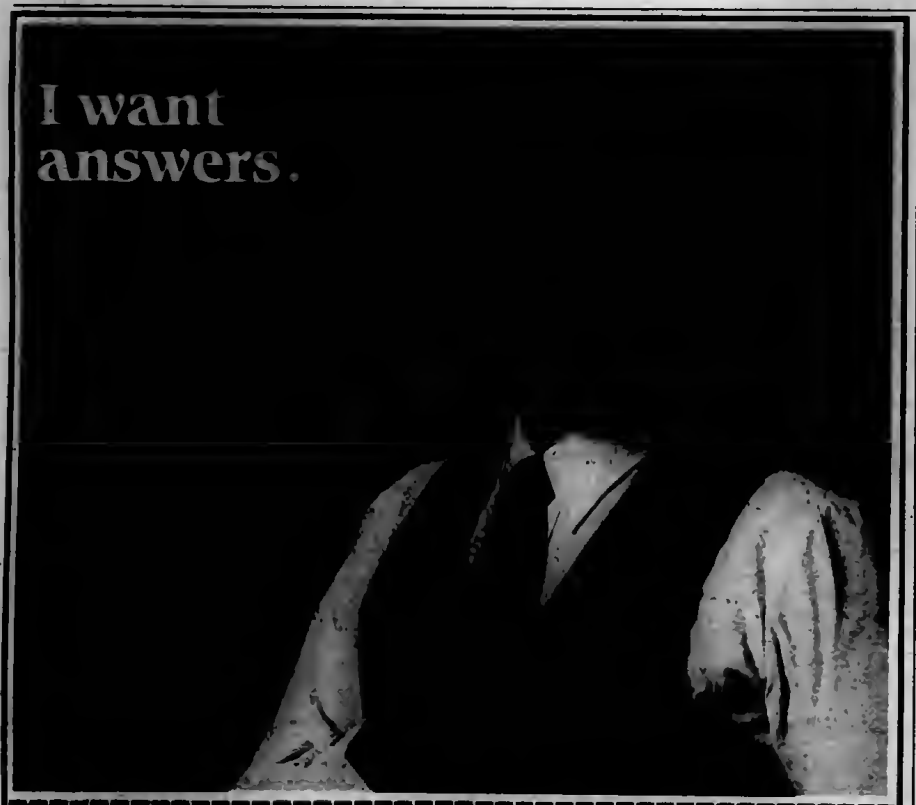
'Toe the line'

The state of California charged that in 1982 and 1983, Kaypro distribution representatives warned 12 to 15 authorized Kaypro dealers orally and in writing that the dealers' discount pricing jeopardized their dealership authorization. "We alleged they told the dealers that if the dealers didn't toe the line, they risked their dealership status," Liao said.

Liao said the alleged coercion referred to most of the personal computer products offered by Kaypro at the time.

"No one product stood out," he said.

A Kaypro spokesman declined to comment on specifics of his company's case but said that Kaypro believes the settlement was satisfactory.



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SUIT from page 83

trade secret misappropriation and unfair competition. Wiseman ruled only on the copyright and contract claims and declined to rule on the other issues. In an earlier ruling, the court had issued a summary judgment that S & H had violated the terms of a license agreement with SAS Institute.

Richard Dohrmann, vice-president of S & H, said the company was surprised and upset by the decision and was planning an appeal. He said the company had been confident of a favorable decision based on four previous rulings turning down injunctions requested by SAS Institute.

The SAS program was designed for use on IBM computers, but in 1981 SAS Institute began working on a version for use on DEC's VAX computers, Wiseman ruled.

The judge found that in 1981, Vanderbilt University Prof. Charles Federspiel and two colleagues, William Vaughn and Wayne Ray, formed a limited partnership, PSAS, Ltd., with S & H as a general partner, and executed a development agreement with S & H to develop a set of programs similar to SAS but for use on VAX computers. S & H licensed a copy of SAS for use on an IBM computer at Tennessee State University but, according to Wiseman's ruling, loaded portions of the SAS source code on a VAX located at Federspiel's department at Vanderbilt and translated the code from the IBM coding scheme to the VAX coding scheme.

Rejecting S & H's arguments that it sought to run test runs of SAS on the VAX, the judge found "that S & H adopted SAS, wholesale and in detail, as the design documentation for its [Indas] product." The judge found evidence of "slavish copying of structural detail" by S & H and subsequent "efforts to destroy, alter and disguise the evidence."

Wiseman rejected S & H's claim that the court could only order the excising of specific lines of source code from Indas. Wiseman also issued a broad injunction prohibiting S & H from "any marketing of Indas, or any other product copied or derived from Indas or SAS." He ordered S & H to pay the costs of SAS, but said he could not order S & H to pay attorneys' fees.

SAS Institute declined to say whether it would pursue further remedies for the issues on which the judge declined to rule.

Dohrmann of S & H said certain circumstantial events, such as putting the SAS package up on the VAX, certainly looked bad and appeared to cause the judge to disbelieve S & H claims.

Dohrmann noted that Wiseman ruled that an earlier version of the SAS package was developed in part under federal grant and therefore is in the public domain. He said the SAS Institute only claimed that one-half of 1% of Indas' 186,000 lines of code was similar to SAS code, while 30% of code in the later SAS package was identical to the earlier version.

S & H, which markets other software products for DEC equipment, began marketing Indas in December and will provide full refunds to the 15 licensees to date, Dohrmann said. He conceded that a lengthy appeals process could effectively eliminate any future marketing potential no matter what the final disposition of the case.

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COMPUTER INDUSTRY

RENTAL from page 84

Wordstar is embedded in the Epson America, Inc. Geneva computer or Multiplan in Tandy Corp.'s Model 200, prevent them from being rented?

Assuming that behavior is not prohibited, then the bill must be limited to applications programs stored on floppies or magnetic media.

If so, then there are large federal tax implications. Under current tax laws, it is cheaper in many circumstances to lease a program than to buy it. If software is bought outright, then under Revenue Procedure 69-21, it must be amortized over "five years or such shorter period as can be established by the taxpayer as appropriate in any particular case." If the software is rented or leased, then it can be deducted as a rental expense under Internal Revenue Code § 192. The consequences can be severe. Consider the following example:

To start my new business I need two computer programs; one costs $25,000 and the other $250. Both have a five-year life expectancy, but I think I will only need them for 24 months. If I have to buy the software, I must spend $25,250 before I even start business, and I am limited to a $5,050 deduction each year unless they have shorter life expectancies. In comparison, assume I lease the programs for $800 a month. I now have a yearly deduction of $9,600. The $15,650 difference in first-year out-of-pocket expenses could mean the difference between success and failure. Assuming I am correct in my 24-month estimated need, my total out-of-pocket expense will be $19,200. This is $6,050 less than if I had bought them.

TRILOGY from page 83

product to sell and posted only modest revenue last year after scrapping projects to develop wafer-size semiconductors and a large IBM-compatible mainframe. Most of the revenue was generated by the sale of development contracts and from proceeds from a research and development partnership with Sperry Corp. that has since been discontinued, Montgomery said. The company expects no significant revenue from new products until late 1986, he added.

Central to Trilogy's new direction is the recycling of several advanced techniques perfected during its aborted wafer scale project — notably chip-packaging and high-performance semiconductor interconnect technologies — and a multichip module project that is at least a year from full production, Montgomery said.

He said Trilogy has yet to decide whether production of the new chip will be done in-house or whether the company will acquire a semiconductor firm to produce the module and generate revenue. "We're looking at something like California Devices, Inc.," Montgomery said. California Devices is a San Jose, Calif.-based semiconductor manufacturer with which Trilogy briefly engaged in merger negotiations last December.

Trilogy's cost-cutting moves to date include leasing one wing of its Cupertino headquarters to Hewlett-Packard Co., taking a $1.4 million write-down by shutting down its $7 million manufacturing plant in Ireland last August and trimming staff from 600 to approximately 180 employees during 1984. Trilogy is still trying to lease its computing facilities to local companies and is seeking tenants to take over its wafer fabrication plant here, Montgomery said.

In another belt-tightening measure, Trilogy decided last month to discontinue developing a high-powered, IBM-compatible workstation. Montgomery said Russell Drew, former Trilogy marketing vice-president, will proceed with that project as an outside venture.

During the first nine months of 1984, Trilogy's losses totaled $79 million on revenue of $10.2 million. Montgomery said Trilogy's long-term debt at the end of 1984 totaled $34 million, with current liabilities for the period totaling $17 million. Though year-end figures have not been released, Montgomery said Trilogy will post a loss for the fourth quarter of 1984 and for the year.

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work, yet networking is recognized by almost all customers as imperative. To keep our customers, we will have to offer a network version of Multimate within six months.

It is easier for a word processing package to be tailored to a network than it is for a spreadsheet or a data base. The word processing vendor doesn't have the problems of file and record locking. It will take the other vendors more time to develop network packages.

Q *How will network software be priced?*

A license for a master on a file server will be more expensive than the current price of a package; the cost for each node will be less. With two or three users, a corporation would lose money. With eight users, the company may save money.

Q *Should software be copy-protected?*

Our software is not copy-protected. Generally, our customers do not want to buy copy-protected software. Copy protection creates inconveniences for customers working in a professional, honest manner. Yet we have a mechanism that would allow us in two days to include copy protection.

We know that for every package we sell, there is a second copy produced. We are not sure how the other copies are used. If a user has one copy in the office and one at home, we do not mind.

We are working with [the Association of Data Processing Service Organizations, Inc.]. If an industry copy-protection standard is adopted, we will endorse it.

Q *Will Microsoft prices soon fall?*

Generally, vendors will add features rather than lower prices. We have not noticed that other companies are lowering their prices.

There have been price cuts. It is a distribution problem with dealers and distributors — not vendors — cutting prices. That problem seems to be ending. If prices do drop, we would unbundle some of our features and offer different versions of the product at lower prices.

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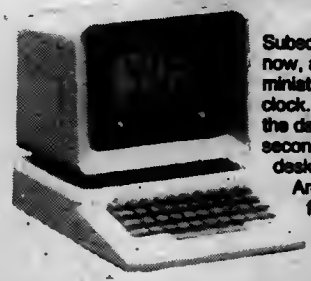

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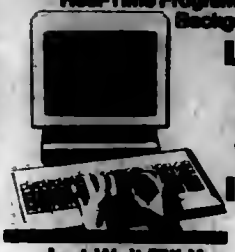

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- CICS — These individuals will assist the CICS team to develop new enhancements to our current products and maintain these systems. A thorough understanding of CICS is necessary.
- IMS-DC/VTAM — This person will provide our group with the expertise in VTAM or IMS-DC to bring a new product to market.
- File-AID — This individual will contribute to the File-AID team by assisting them in developing and maintaining the File-AID product line. A good understanding of OS and MVS systems, data management and file systems is necessary along with a thorough comprehension of ISPF/PDF.
- DOS — We are currently looking for individuals to assist us in converting our products to DOS SP2.1 and to assist in the development of a batch interactive testing facility using STAIL.

PRODUCT SPECIALISTS

The Product Specialist is the sales/technical interface of the Products Division. Their primary responsibility is to provide the sales staff with the tools that are necessary to sell our products and to provide our customers with the training and support they need to use our products. In-depth knowledge of programming environments and our products is essential. Specific areas of concentration are:

- DOS — Our involvement in the DOS marketplace is always increasing. Due to this expansion, we require an individual that understands the DOS environment to assist our sales staff and development team to market our products and further improve our presence in the marketplace.
- File-AID — This product has expanded so rapidly that we need to add another Product Specialist to our staff. This individual will possess excellent presentation skills and a thorough knowledge of ISPF/PDF.

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The Product Support Representative's purpose is to supply the highest level of professional and technical assistance to Compuware's customers and sales staff. Specific areas of expertise that we are looking for include:

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- GENERAL SYSTEMS — This individual will provide support to our customers and sales staff in the use of our CICS product line.
- GENERAL SYSTEMS — This individual will provide support to our customers in a variety of areas. We are looking for an individual with a good systems background.
- DOS — This person will interface with our customers and sales staff to support our DOS line.

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The Director will

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- Be responsible—as designated through the Vice Presidents for Academic Affairs, Educational Development and Research, and Finance and University Services—for academic and administrative computing
- Maintain an active liaison with units involved in the development of video facilities and their utilization
- Provide a University-wide resource for information and advice about the use of information technology, particularly word processing and office automation
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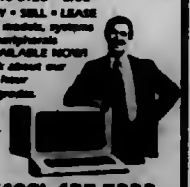

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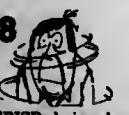

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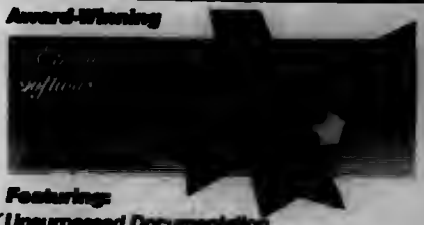

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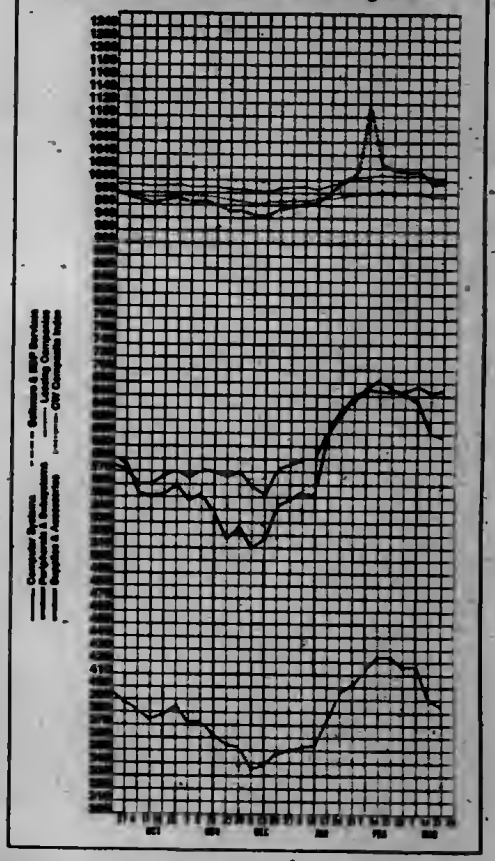

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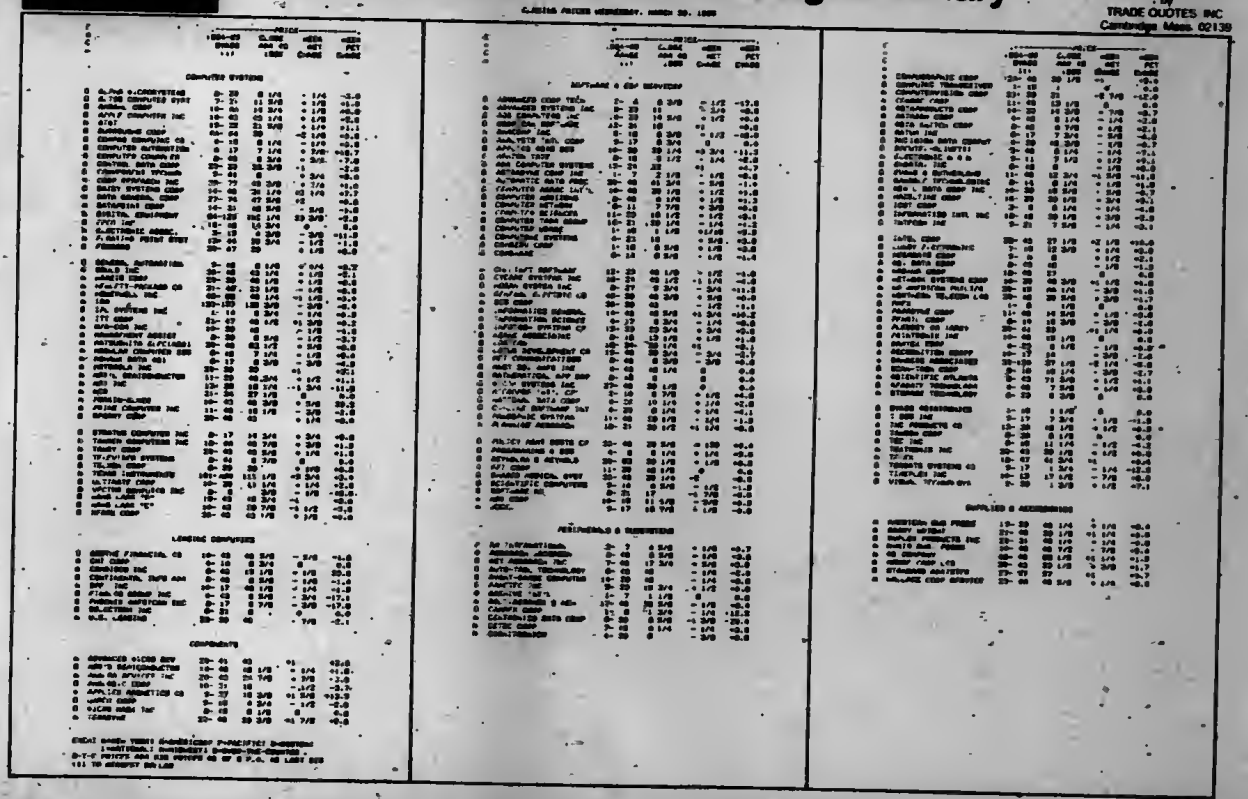

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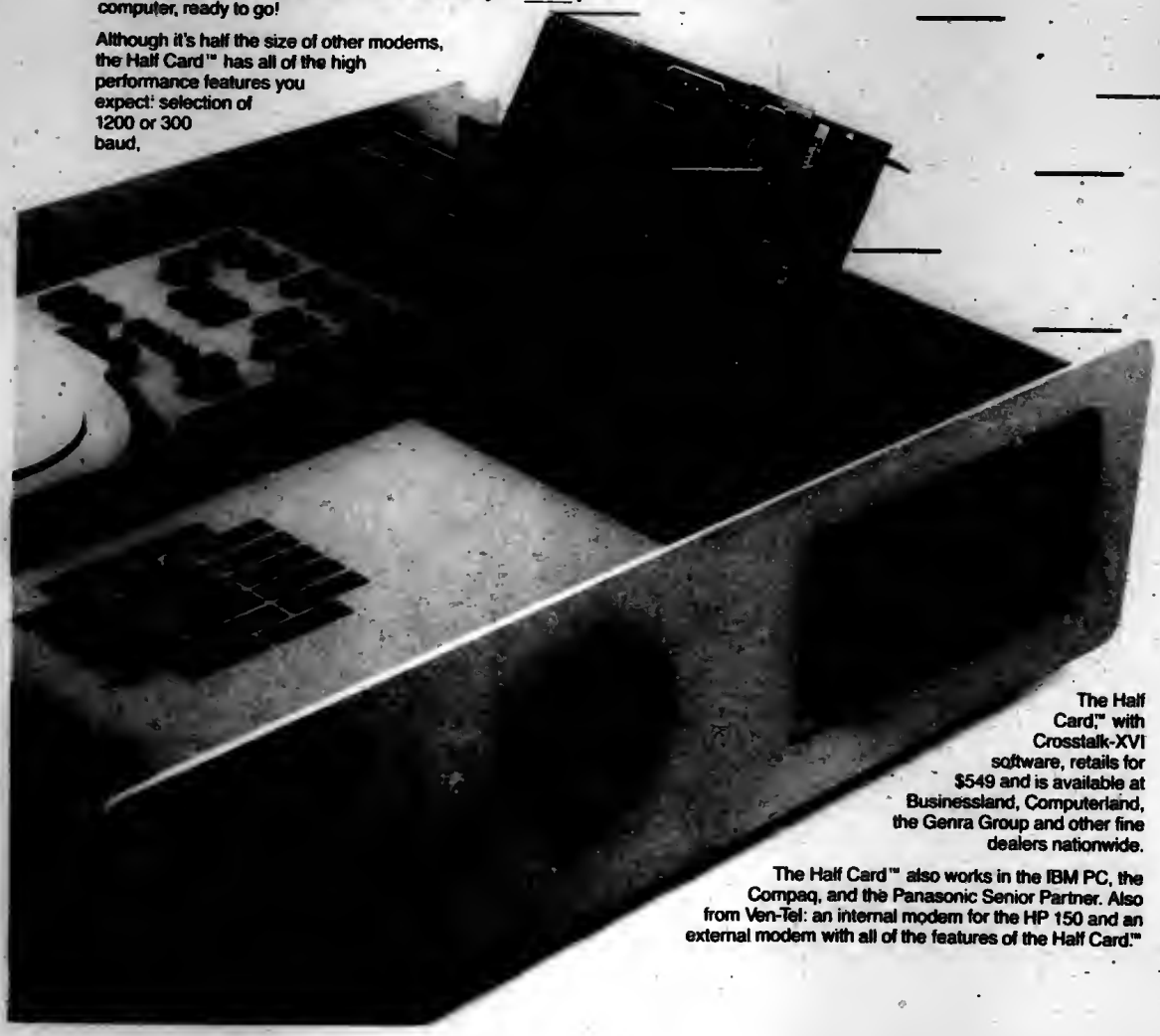

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